The Pioneer Electrical Journal of America.

PUBLISHED EVERY SATURDAY BY

THE W. J. JOHNSTON COMPANY, Limited.

41 PARK ROW (TIMES BUILDING), NEW YORK.

Established 1874. Incorporated 1889.

Telephone Call: Cortlandt 924. Cable Address: "Electrical," New York.

New England Office, 620 Atlantic Ave., Boston.
Western Office, 936 Monadnock Block, Chicago.
Philadelphia Office, 927 Chestnut Street.

SUBSCRIPTION IN ADVANCE, ONE YEAR, $3.

(Including Postage in the U. S., Canada or Mexico.)

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VOL. XXII. NEW YORK, SEPT. 30, 1893. NO. 14.

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The New York Street Railway Association. AT the recent meeting of the Street Railway Association of the State of New York, at Rochester, many of the prominent street railroad men of the State were present and took part in the proceedings. Perhaps the most important feature of the session was the report of Mr. T. J. McTighe on "The Return Circuit for Electric Railways," in which he considered at length the various methods now in use, and described what, in his opinion, was the most satisfactory solution of the question. A paper by Mr. G. W. McNulty, engineer of the Broadway cable road, New York City, on "Recent Improvements in Cable Traction," had been looked forward to by the members, but unfortunately it was found necessary to postpone this interesting report until the next meeting, which will take place on the third Tuesday in September, 1894, at Syracuse.

The Canadian Electrical Association. THE third convention of the Canadian Electrical Association was held at Toronto on Sept. 13, 14 and 15. This organization, while young, has already done considerable good work, and gives promise of exerting an even wider influence upon the electrical industry in Canada in the future. At this meeting papers covering a wide range of subjects were presented, and their reading was followed with interest by those present. It is perhaps to be regretted that the discussion of these papers was not more active. One of the greatest benefits resulting from such gatherings is the criticism of the papers by others who have had experience in the same line, and who are able to point out mistakes or add to the information presented from their own store of knowledge. The convention was counted a successful one, and the members adjourned with the intention of making the meeting at Montreal next year of still greater importance.

An Extraordinary Lawsuit. IN this issue we commence the publication of a report of the legal proceedings brought by Mr. Martin against THE ELECTRICAL WORLD, with some explanatory comments thereon. The chief end which Mr. Martin had in view—to make THE ELECTRICAL WORLD pay him some cash—is made apparent, and the part of the report which we publish in this issue shows the plan he formed for the accomplishment of that purpose. His plan, as the report shows, was something other than the ordinary everyday or commonplace basis for a lawsuit. Of course we would expect it to be so when Mr. Martin was the author of it. It was somewhat original, and bore all the marks of deep and careful study and of the expenditure of much ingenuity. But it was only a theory—in practice it was lame—and in the test it failed to work. To learn how the structure was patiently reared up and how, without much noise and by introducing into it a few facts which the original plan was not designed to contain, it tumbled down, will repay the reader for the time spent in scanning our report. It will also show him how acts of the most trivial kind done for the most innocent and harmless purpose can by pains and ingenuity be made to serve, if not lastingly, at least for the time being, purposes which are neither innocent nor harmless. This report of the case might have been published some time ago, had it not been for the pressure upon the reading columns of THE ELECTRICAL WORLD during the last few months. However, nothing particularly has been lost by the delay. Any one who will read the proceedings and study the simple and secure means by which it was supposed that the end in view could thereby be reached will be impressed that Mr. Martin was possessed of three excellent qualities: industry, patience and prudence, though on one or two occasions during the heat of the contest he seems to have parted company with the last. However, as we note with what care and foresight he strove through all his performance to avoid one fact, the danger arising from which he seems from the outset to have very properly realized, we must admit that his judgment, on the whole, was of better quality than that which it is ordinarily the lot of mankind to possess. While he did not entirely clear this danger, he has erected to himself a monument by the ingenuity of his efforts made in that attempt; but, judged by the fruits he has realized from these efforts, his warfare on THE ELECTRICAL WORLD was, after all, nothing more than a leap in the dark. Some clown, the creation of the novelist, has said, with more philosophy than befitted his calling, that he always knew "ambition" was made especially to rhyme with "perdition." There is a deal of wisdom in this; also in the old adage, that we should look before we leap.

The Incandescent Lamp Decision. IN another column we give the main points of the opinion of Judge Lacombe granting a preliminary injunction against the use of Edison lamps by two central stations in New York City, which is unusually interesting from the sharp definition of several disputed points, and the apparent belief of the judge that there will be no great difficulty in the defendants procuring non-infringing lamps. One of these points is the affirmation of the right of an owner of a patent to fix arbitrarily the terms on which he will allow others to use it, or to wholly refuse assent to such use. The only qualification of this is, that in exercising this right the patentee may so conduct himself as to be no longer entitled to the aid of a court of equity in maintaining his patent. In referring to those entitled to the claim of consideration, the judge decides that they are confined to the users of the lamp for the purpose of availing of its light—the unskilled public, who, with no knowledge of electricity, of patents, or of controversies and litigations as to inventions, bought something which they found on sale in the open market. This class, as defined by the Court of Appeals, are those who supplied themselves with electric lighting plants before the decision of the Circuit Court sustaining the patent, and who are now willing to accept their lamps from the complainants upon reasonable terms; they have much stronger equities than the manufacturing infringers, but the court will only determine what would be reasonable terms in each case upon the particular circumstances of that case. The judge apparently has been following the electric lamp industry in its recent course, as he seems to intimate that there are other lamps on the market which do not infringe the Edison patent. He states that it is not shown what efforts the defendants have made to supply themselves with lamps not infringements of the Edison, and that they have not shown that no other lamp would serve their purpose. With this in view, he decides that it is difficult to see where they have any equities as against those of the Edison company, as an injunction will still leave them competitors, even during the life of the Edison patent—perhaps, however, under more difficult conditions due to the existence of that patent. In harmony with this is the qualification that the injunction granted may, on application, be suspended "for a reasonable time to adapt fixtures to receive new lamps."

A. I. E. E. Local Meetings. As a correspondent, whose letter will be found in another column, correctly infers, we were partly misled in our editorial remarks by the report of the Chicago conference, published in the same issue, as to the basis upon which it was proposed to hold local meetings of the Institute, but we find nevertheless that our comments still largely cover the real case at issue. While we favor local meetings for purposes of social and professional reunion and for the discussion of papers read before all the local bodies as well as the main body of the Institute, we do not, as remarked before, approve that part of the proposal which involves the multiplication of papers. Our objection was not based upon any ground that the New York meeting is the only appropriate one at which to read papers, as implied by a Western contemporary, but rather upon grounds of expediency. The present conditions, for reasons given in the editorial referred to, tend not only to maintain a higher standard, but they also avoid the disaffection that would undoubtedly result in a local body before which a rejected paper was to have been read. It is easy to imagine the irritation and even estrangement likely to follow if a local body were deprived of hearing a paper read by a popular member through the veto of a distant committee, or the jealousy that would be excited by the greater success of other local bodies in having their papers approved, even if they possessed superior merit. Above all, the standing of the Institute depends almost entirely upon its papers being maintained of a high professional character. Any lowering of this would be doubly unfortunate for the reason that it would tend to divert the more valuable papers to other channels that would not be far to seek. In other words, any action is to be regretted that would lead to the loss of standing by the Institute or to the creation of causes that would tend to disintegrate it, and both of these possibilities are present in the plan whose main idea seems to be the creation of local meetings for the purpose of encouraging the increase of papers. Instead of still further multiplying papers it would perhaps be wise, particularly in the light of recent events, to revise and render more stringent the present method of scrutiny of those now offered. The objections referred to could, it seems, be met by a system through which copies of a paper accepted by the Council would be sent to local bodies for reading and discussion at their respective meetings—all on the same day if desirable—the New York meeting in this respect becoming a local one. Local secretaries could then edit the discussions and forward them to the author of the paper, who in turn would send them with his final remarks to the Editing Committee for further application of the blue pencil, if desirable. Two objections at once occur to this system, the presence of the author at only one meeting and the duplication of remarks that would almost necessarily follow. A slight consideration will show that the first objection has really little weight, and the author is sometimes absent even under the present system. The second objection could be almost entirely obviated by the editing committee, and would even possess an advantage by bringing into relief the more important points of a paper. A very great advantage would be that a paper would be threshed out more on its merits than at present, on account of the absence of the author and of local and personal influences; not only this, but in view of the severe trial it would have to undergo, an author would be impelled to take the utmost pains in the preparation of his matter. Among the incidental advantages would be the check on the Committee on Papers through criticisms that would be more probably called forth, in case of the approval of a poor paper, than at present, the awakening of the interest of distant members in the elections of the Institute, and the less likelihood, therefore, of any clique ruling the body to further its own equivocal ends. The general introduction of the editing system might also result in the suppression of much discussion which, it is sometimes uncharitably said, owes its origin merely to the desire to figure largely and frequently in the *Transactions*, regardless if what is said has any real bearing or not on the subject under discussion.

Local Meetings of the American Institute of Electrical Engineers.

To the Editor of The Electrical World:

The editorial in your issue of Sept. 16 relating to so-called "branches" of the American Institute of Electrical Engineers I think was written from reason of an imperfect understanding of the subject, gained from the incomplete reports of the recent Chicago meeting.

The true idea is this: When a sufficient number of members and associates of the Institute, in any section of the country, request that a meeting be held in their locality, the secretary must, under Rule VI., issue a call for such meeting. It is probable that the meeting will be attended by members living in the neighborhood of its location, as in the case of the New York City meetings. At this meeting nothing can, under the rule, be done other than the business set forth in the notice. Such meetings should be called only for the reading and discussion of papers, whose titles, at least, should be duly stated. So far every procedure is strictly within the rules. Beyond these things come the questions of expediency and utility.

My own opinions are, as expressed at the recent Chicago meeting, that the following results will appear: 1st. Increased membership, and consequently increased financial ability. 2d. Increased aggregate attendance of members at the several meetings. 3d. Increased discussions of the papers. We all know how often the discussions are of more educational value than the papers themselves. 4th. Increased benefits to the members, arising from these other conditions.

The criticism which you make is mainly the one of the possibility of publishing in the "Transactions" too much of immaterial matter, and that of the sectional jealousies which might be engendered if one locality be favored more than another. I think that you do not give the council sufficient credit for impartiality. It now exercises discretion in the publication of papers and can still do so, even with an increased number. Why should the member from San Francisco feel more aggrieved if the council rejects his paper if read and discussed in San Francisco, or Chicago, instead of in New York?

Many good men have neglected joining the Institute because of inability to attend the meetings in New York City. Of course, I think they have pursued a mistaken policy. The printed "Transactions" are worth more than the dues. Many good things have been lost because absent members do not discuss the papers.

I advocate trying the scheme; not as "branches," but as part of the trunk, under the authority which the rules now confer. If found in any general way inexpedient such meetings can be abandoned. N. S. K.

World's Fair, Chicago, Sept. 18, 1893.

The Meeting of the American Institute of Electrical Engineers.

The seventy-ninth meeting of the American Institute of Electrical Engineers was held at its headquarters in New York on Sept. 20, 1893, with President E. J. Houston in the chair. The attendance was large, and the reading of a long list of new members, given below, was received with applause.

Some discussion was caused by the action of the Council in ordering to be printed, without reading, a paper of a non-member of the Institute which had been read before another society. The paper referred to was one by Dr. W. J. Morton on "A Brief Glance at Electricity in Medicine," which was read before the New York Electrical Society on May 17. Mr. T. D. Lockwood protested in vigorous terms against permitting a paper read before another society to be thus published at the expense of the Institute, and asked if the editing committee had consented to the publication of the paper. While acknowledging the high scientific acquirements of Dr. Morton and the great value of the paper itself, Mr. Lockwood challenged the right of the Council to thus establish a precedent for printing papers of another society, or of non-members, in the Transactions, and at the expense of the Institute. The chair explained that Mr. T. C. Martin had asked Dr. Morton to prepare a paper for the Institute, and that the authoritative character of the paper in question was thought by the Council so great as to warrant its being printed in the Transactions. Mr. G. M. Phelps asked that the discussion be ruled out of order, and a motion was finally adopted to proceed to the reading of the paper on the programme.

Mr. D. McFarlan Moore read his paper on "A New Method for the Control of Electric Energy," in which a vibrating device was described for regulating voltage. The apparatus consists of a vibrating armature, whose rate of vibration is controlled by approaching or receding the core of a magnet; at each vibration a circuit is made and broken, or the contact pressure is varied, although the author did not conclusively show that this latter principle entered. Aside from the author's explanation, it would seem that the reduction in voltage is caused partly by the magnet windings acting as a choking coil, and partly because the effective E. M. F. is reduced to the square root of the sum of the squares of its value at different times, these values varying from a maximum to zero.

The discussion of the paper was participated in by Messrs. A. E. Kennelly, P. B. Delaney, T. D. Lockwood, Chas. Cuttriss, F. W. Jones, E. P. Thompson, W. J. Hammer, G. S. Gunn and President Houston.

President Edwin J. Houston then delivered his inaugural address, the subject being "The Chicago International Congress," which dealt in a masterly manner with the work of the Congress, pointing out in what respects it succeeded and where it failed, and referred in glowing terms to the great accomplishments and magnificent possibilities of electricity. The address was received with great applause, and Mr. T. D. Lockwood, in his usually felicitous manner, moved a vote of thanks, which was seconded and unanimously and cordially adopted.

At the conclusion of his address Prof. Houston called attention to the great desirability of standards of light and illumination, a matter upon which the Electrical Congress had arrived at no conclusion, and requested authority to appoint a committee composed of members having facilities for carrying on the necessary experiments, for the purpose of making a thorough and scientific investigation of the subject, in order that the Institute may be able to submit a definite programme to electrical bodies throughout the world for discussion with a view to final adoption. He stated that Mr. Preece had consented on his part to co-operate in England with the committee and to undertake experiments with the same object in view. A motion granting the necessary permission to appoint and instruct a committee was later seconded and unanimously adopted.

During the discussion on Mr. Moore's paper the chairman noticed Mr. Preece among the audience, and invited the distinguished honorary member of the Institute to a seat on the platform. Upon the conclusion of President Houston's remarks, Mr. Preece was asked to address the meeting, which he did in a graceful, pointed and witty manner, which has established his reputation as one of the most effective and versatile speakers in the scientific circles of England. He referred to the great pleasure which he had derived from his latest visit to America, and also to the great professional benefit gained from it. He spoke of his proposition to co-operate with the Institute in its endeavors to establish units of light and illumination, and alluded in particular to the great desirability of establishing a unit of illumination. The address of Mr. Preece was in an especially happy vein, and left the impression with some that it was perhaps well for "Our Chauncey" that circumstances prevented the distinguished Englishman from coming into direct rivalry with him.

Mr. C. P. Steinmetz brought to the attention of the Institute the desire of some 15 members of the Institute at Lynn, Mass., to hold local meetings at that place, and to learn what arrangements, if any, would be permitted to enable the Thomson Scientific Club to participate in the meetings, if these were allowed. The secretary, Mr. R. W. Pope, said that the subject of local meetings of the Institute was now before the Council, and suggested that the members at Lynn should make a formal proposition, stating their views, which would then be considered along with the other cases by the Council. The meeting then adjourned.

The following gentlemen were admitted to the Society as Associate Members:

G. S. Sacco, Chicago, Ill.; G. H. Almon, Boston, Mass.; W. E. Anderson, Blacksburg, Va.; L. J. Auerbacher, New York City; E. A. Barnes, Chicago, Ill.; T. W. Blake, Bristol, R. I.; H. B. Boardman, Milwaukee, Wis.; L. S. Boggs, Chicago, Ill.; C. A. Bragg, Philadelphia, Pa.; W. H. Bremer, Montreal, Can; W. R. Brixey, New York City; W. C. Burton, Milwaukee, Wis.; W. J. Cetta, Newark, N. J.; T. J. Creaghead, Cincinnati, O.; D. H. Decker, New York City; O. G. Dodge, Chicago, Ill.; Alex. Dow, Wheaton, Ill.; R. Eickemeyer, Yonkers, N. Y.; J. S. Fitzmaurice, Sydney, N. S. W.; G. C. Fiegell, Vintoif, Ia.; T. French, Jr., Cincinnati, O.; S. D. Greene, New York City; C. S. Hammatt, Jacksonville, Fla.; C. C. Haskins, Chicago, Ill.; F. K. Irving, Brooklyn, N. Y.; Kunihiko Iwadare, Osaka, Japan; J. N. Johnson, New York City; E. E. Keller, Chicago, Ill.; J. G. Kirkegaard, Brooklyn, N. Y.; E. A. Merrill, New York City; S. D. Mott, Passaic, N. J.; S. E. Nutting, Oak Park, Ill.; J. S. Paul, Princeton, N. J.; F. M. Pedersen, New York City; Sam. Reber, Baltimore, Md.; N. N. Ross, Winnipeg, Man.; A. McShoen, Atlanta, Ga.; William Shrader, Columbia, Mo.; H. M. Seitzinger, Wilkes-Barre, Pa.; E. W. Stevenson, New York City; M. G. Stratton, Lawrence, Mass.; Captain L. Sventorzetzky, St. Petersburg, Russia; H. H. Walt, Chicago, Ill.; E. P. Warner, Chicago, Ill.; J. H. West, Desplaines, Ill.; C. F. Whittemore, Chicopee Falls, Mass.; A. E. Worswick, Montgomery, Ala.; J. G. Wray, Janesville, Wis.

Laboratory Notes.—IV.

BY LIEUT. F. JARVIS PATTEN.

All these will be derivable from your house circuit through your motor dynamo and other auxiliary contrivances, if you fix the machine properly to suit these different wants.

First, a single alternating current is required, and we are told in the books that if the armature circuit of a direct current dynamo be connected at two opposite points to two sliding ring contacts, then an alternating current (single phase) will be delivered to an external circuit connected to the brushes that bear on these rings. It makes no difference what form of armature is used, whether Gramme ring or drum, the result is the same. Likewise if the machine is run as a motor without load on the direct current circuit, the current that passes through the armature may by such rings be led off to an external circuit as an alternating current having a true sine function, and not simply a reversed current, as might be supposed.

Fig. 1 is a diagram of the arrangement; a Gramme ring winding is shown connected to its collector in the usual way, and two rings, r_1 and r_2, are connected to opposite points of the winding. Brushes bear on these rings, and in a circuit connected to them an alternating current will flow when the armature is driven in its field either as a dynamo or as a motor.

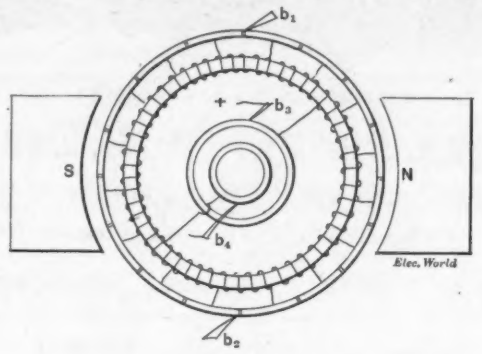


Fig. 1.

It will be generally found, however, that direct current motors seldom have sufficient spare room on their spindles to place the rings as required; besides, it is not always an easy matter to open or break the armature circuit at opposite points, as would appear necessary from an inspection of the diagram. An easy and simple way of arriving at the same result without encountering these difficulties will be seen if you select a machine that has a long commutator; that is, long in the direction of the spindle, and there are numerous types to be found that have quite long commutators.

The plan of arrangement is shown in Fig. 2. Two insulated brass rings, r_1 r_2, are slid on over the commutator and fastened one near each end, care being taken to leave between the rings as much room as possible for the machine brushes. The brass rings are carried upon insulating pieces of fibre, rubber or wood, which fit snugly to the commutator surface and keep the rings from turning.

The two rings in place, one is connected by a long screw passing down through the insulating part to one segment of the collector, no matter which one is chosen, and the other ring is connected in the same way to the collector segment which lies diametrically opposite to the one first connected. You then take a piece of fibre or dry hard wood of suitable size and secure it to the brush carrier of the machine. A brass rod or bolt in each end of this will carry the brushes bearing on the two rings. This completes a motor-dynamo for transforming a constant potential direct current to a single phase alternating current.

The general plan is shown in Fig. 2. N S are the

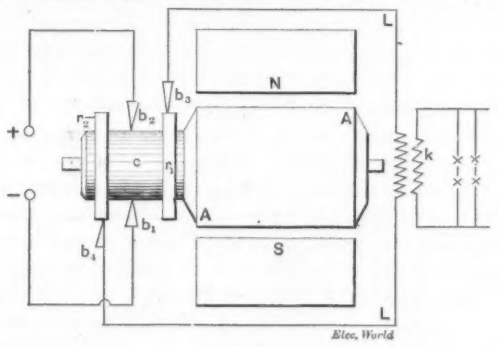


Fig. 2.

field poles of the motor, A is the armature, C is the ordinary collector with its brushes b_1 b_2, which are connected to the direct current circuit in the usual way. r_1 r_2 are the auxiliary rings connected electrically to opposite segments, and b_3 b_4 are the brushes to which the external alternating current circuit is connected. Having made this arrangement, you are then, so far as alternating current is concerned, practically independent of the voltage of the house circuit, for having an alternating current in the circuit L, Fig. 2, by an ordinary converter K of your own construction, you can change the voltage and amperes of the alternating current in any desired way. Thus, if you wind the converter 5 to 1—that is, five turns in one winding to one in the other—then, by transforming voltage upward, assuming, say, 100 volts at 25 amperes for your primary, you would have 500 volts at 5 amperes approximately, or working backward, transforming down, as it is usually called, you would get 125 amperes at 20 volts, neglecting the necessary losses of conversion. Thus your range of experiment has greatly broadened from your initial point of 110 volts and 20 amperes direct current.

By a slight modification of the arrangement just described you can as readily obtain "triphase" alternating currents, or three separate alternating currents having a phase difference of 120 degrees. This is done by simply putting three rings on the collector, as described, instead of two, always supposing the collector long enough to admit of this arrangement. The three rings in this case are connected each to one of three equidistant segments around the collector. There will be a brush for each ring and three leads, and in these circuits the motor-dynamo will deliver a three-phase alternating current, or what the Germans call a "dreh-

strom" current. Strictly translated, this, means a rotary current, and might be biphase as well as triphase, the idea being, however, that the "drehstrom" will produce the rotary field effect if properly connected for this purpose. This is a very important derivation from the 110-volt direct current, and is very easily obtained in the manner referred to. With this current you can have a rotary or revolving magnetic field, an effect not obtainable in any other way. Besides this, the triphase current, as will be explained later in connection with the subject of motor transformers, admits of reconversion to direct current, so that after changing the volts and amperes of the triphase current by the ordinary converter method, you can, with the aid of a suitable motor transformer, reconvert this altered triphase current to a uniform direct current. It may be stated here in passing that a more instructive course of practical experimental work could hardly be suggested for the student than to arrange for himself, design and construct, the devices for making these various transformations; nothing can so thoroughly familiarize the young engineer with the actual "why and wherefore" of these different operations.

Two practical suggestions require a few lines before leaving this subject of multiphase current transformation.

First, in selecting your dynamo or motor for this use you will see that it is of the greatest importance to get a machine having a collector with 12, 24 or 48 segments; that is, any number divisible by 12, and, of course, therefore divisible by 3, without a remainder, for connecting three rings. Thus a collector having 30 or 40 segments, very usual numbers, is not well adapted to this purpose, as the three triphase currents would not be accurately symmetrical.

The second point is this: In arranging the three rings on the collector it is advisable to make the "outer" ring, by which I shall designate the ring nearest the bearing, movable, so that its position on the collector can be changed at pleasure. Suppose the three rings to be arranged for collecting triphase currents, and you desire a single alternating current instead. You then simply disconnect the outer ring, turn it through 60 degrees or a sixth of a circumference, so that its connecting screw will bear on a segment of the collector opposite to the one to which the inner ring is connected and secure it in that position.

The brush is then thrown off the middle ring, or its lead is disconnected, and the two outside leads connected to the inner and outer rings will have a single alternating current, as before explained.

(To be continued.)

Storage Battery Decision.

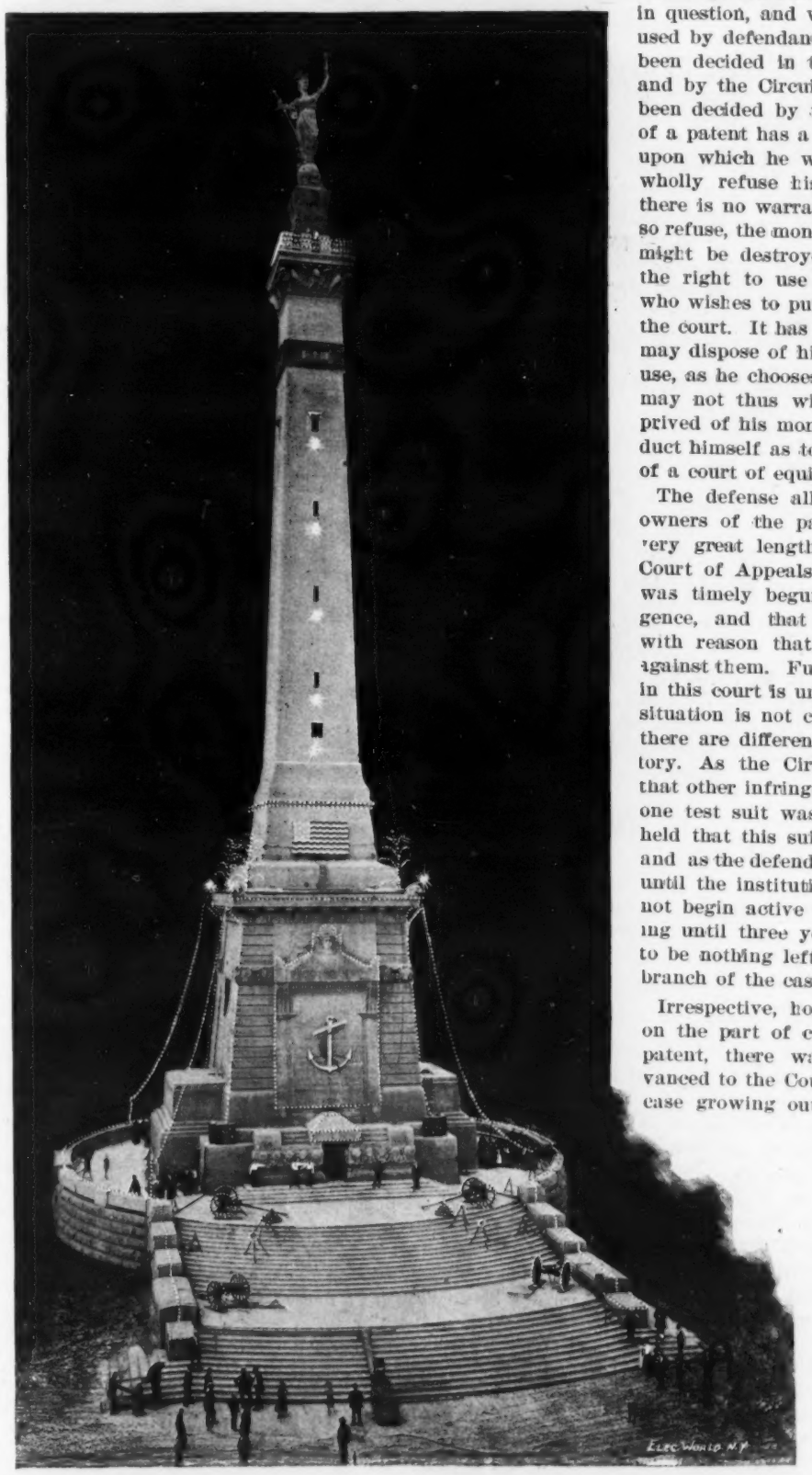
Judge Colt, of the United States Court for the District of Massachusetts, has just handed down a decision enjoining the Milford & Hopedale Street Railway Company from infringing the Brush Storage Battery patents. The suit was brought by the Brush Electric Company and the Consolidated Electric Storage Company, as complainants. The defendants made a vigorous and persistent defense, and had a large array of able counsel. Their defense was, that the defendant's battery was of the Plante type, and required a process of "forming" before it became active. Ribbed plates were used, and packages of red lead wrapped in thin sheet lead were held between the ribs. As the wrapping had to disintegrate before the red lead was reached by the battery fluid the defendants claimed that the battery was Plante in character. Judge Colt held that to come within the Brush patents the plate need not be "coated" with active matter; it is sufficient if it is "combined" with matter "adapted" to become active.

The Milford & Hopedale Street Railway Company runs all its cars by storage batteries. It claims that the system has been a great success, and in this belief the company has built a large station and storage battery plant, and is about extending its lines into Boston. It is too soon to predict with any certainty what course the company will now take. The obvious one would be a license from the complainants.

Electric Decorations at Indianapolis.

At every celebration of any importance, whether it be national or local, electricity now plays an important part, and each year effects more brilliant and beautiful than have before been brought out are produced. During the recent national encampment of the Grand Army of the Republic, at Indianapolis, Ind., the electric decorations were of surpassing beauty and attracted marked attention. The Soldiers and Sailors Monument was happily chosen as the crowning glory of the illumination, and the work was largely concentrated upon it. For some time previous to the meeting Mr. E. J. McAllister, of the Edison Lamp Department, was present and gave his personal attention to the details of the work. He was ably assisted by Messrs. E. F. Pickert, F. L. McCutcheon and G. P. Tripp. Around the balustrade at the top of the shaft a triple corona of light was cast down upon its column and up toward the statue crowning the top. Back of the first astragal windows were placed electric reflectors, throwing into bold relief the dates. Down toward the earth a girdle of lamps encircled the monument and served as an introduction to the display below, where the navy astragal was placed. In the centre of the panel on the south side an immense American flag outlined in lamps of appropriate colors seemed to wave as though floating in the wind.

As a background to the four lion heads rose four sprays of lights of various colors, and below the heads ran a second belt of lamps. The corners of the pedestal were outlined in lamps, as also the borders of the large panel on the south side. The most atractive display on this side was a huge anchor, typical of the navy, outlined in pure white lamps. Over the corner head at the top of the panel a delicate wreath of miniature lamps cast a soft glow on the laurel leaves below. The panels on the east and west side each supported a large American shield, also outlined in light, while on the northern panel was suspended a monster wreath of laurel, with myriads of lights glowing here and there through the foliage. At the base of the main pedestal



MONUMENT AT INDIANAPOLIS ILLUMINATED BY ELECTRICITY.

were placed eight electric wheels, two at each corner, bearing on their face various artistic designs in lamps, which changed color and arrangement as the wheels revolved.

The main doorway of the monument was outlined in light. On the upper landing were placed two pyramids of cannon balls, each ball lighted by a miniature lamp. On the steps leading down from this landing were four stacks of muskets, each with a wreath of various colored lamps thrown gracefully over the bayonets. On the second landing were two field pieces, with their outlines depicted in light. The balustrades of the terraces were also outlined in light, the lamps following the architectural details. To add to these effects four large search lights of 20,000 c. p. each concentrated their rays upon the statue.

Over 500 lamps were used in these decorations, varying in candle power from one to sixteen. The difficulty of placing these lamps was very great. All the display pieces had to be suspended by fine wires from the windows of the shaft, and a large portion of the work had to be done by men suspended in swings, often 70 feet from the ground. The switchboard which controlled the lighting of the whole monument was situated in the corridor. The construction of this switchboard was in charge of Mr. J. C. Terry, of the Edison company.

The Incandescent Lamp Cases.

Judge Lacombe, of the United States Circuit Court for the Southern District of New York, on Sept. 19 handed down an opinion on the motion for preliminary injunction in the three suits brought by the Edison Electric Light Company and the Edison Electric Illuminating Company, of New York, against the Mount Morris Electric Light Company and the United States Electric Light and Power Company.

The opinion states that the validity of the patent in question, and whether or not lamps of the kind used by defendants are infringements thereof, has been decided in the Circuit Court of this district and by the Circuit Court of Appeals. It has also been decided by the Circuit Court that the owner of a patent has a right to fix arbitrarily the terms upon which he will allow others to use it, or to wholly refuse his assent to such use, and that there is no warrant for the proposition that, if he so refuse, the monopoly which the statute gives him might be destroyed by the order of a court, and the right to use the inventions sold to any one who wishes to purchase it on terms to be fixed by the court. It has also been decided that a patentee may dispose of his invention or hold it to his sole use, as he chooses; although the owner of a patent may not thus without assent on his part be deprived of his monopoly, he may, of course, so conduct himself as to be no longer entitled to the aid of a court of equity in maintaining it.

The defense alleging delay on the part of the owners of the patent has already been urged at very great length elsewhere, and twice has the Court of Appeals held that the original test suit was timely begun and pressed with proper diligence, and that no infringers can complain with reason that separate suit was not brought against them. Further discussion of the same facts in this court is unnecessary and out of place. The situation is not changed by the circumstance that there are different infringers with a different history. As the Circuit Court of Appeals has held that other infringers cannot complain because only one test suit was brought, and has further twice held that this suit was prosecuted with due diligence, and as the defendants here were not even organized until the institution of that in May, 1885, and did not begin active operations in incandescent lighting until three years after that date, there seems to be nothing left for this court to decide on that branch of the case.

Irrespective, however, of any question of delay on the part of complainants or of owners of the patent, there was a claim to consideration advanced to the Court of Appeals in the Sawyer-Man case growing out of the obscurity of the patent and the fact that prior to the decision of the Federal Court (in this circuit) sustaining and construing it, there were conflicting decisions upon it in foreign countries. Commenting upon this fact, this court recognized three classes of infringement: First, manufacturing corporations and competitors of the Edison company, every one of which entered upon the business with an understanding of its risks and of the consequences which would befall them as infringers if the patent should be sustained. Second, the users who have supplied themselves with electric lighting plants from infringers which required for their operation lamps of the patent, who did so before the decision of the Circuit Court sustaining the patent and at a time decisions in foreign countries interpreting the patent were in conflict, and who are now willing to accept their lamps from complainants upon reasonable terms, have much stronger equities than the manufacturing infringers. These equities will not be disregarded, but what would be reasonable terms if an application were made by the court on behalf of these users is a question which can only be determined in each case upon its particular circumstances. Third, those users who have acquired their plants subsequent to the decision of the Circuit Court must accept the result as a consequence of their imprudence if they are deprived of the use of the lamps, and, as a consequence, the value of their plants is greatly impaired.

The defendants insist that they are in the second of

these categories, but the court does not so understand the opinion of the Court of Appeals; it is only the users of the lamps for the purpose of availing of their light who seem to fall within the terms of reason of exception—the unskilled public, who, with no knowledge of electricity, patents or controversies and litigations as to inventions, bought something which they found on sale in the open market. The defendants are more properly within the first category. Still the language used by the Court of Appeals is perhaps not so positive as fairly to preclude discussion as to its meaning and conclusion, and may best be disposed of by considering the defendants' contention that they are to be considered as users who installed plants prior to the decision of Judge Wallace establishing the validity of the Edison Incandescent lamp.

All that the Court of Appeals determined as to such defendants was that they had much stronger equities than manufacturing infringers, and that the court would not disregard those equities. In the case at bar, however, there are conflicting equities. On the one side are the defendants who, misled by the obscurity of the patent and the conflict of foreign decisions, invested large sums of money. On the other side there is not only the owner of the patent, but the licensee, which has relied upon the letters patent and confided in the validity of the grant by which the United States undertook to secure the monopoly of this valuable discovery; trusting in this it invested large sums of money in the purchase of an exclusive license and in the construction and equipment of plants in which the lamp was an essential feature. For years it has been compelled to conduct its business not only in competition with other systems using other lamps, which was to be expected, but also with infringers. When, therefore, the complainants ask that for the few remaining years of their patent the infringement of it shall be stopped by the court, they certainly show equities which as much entitle them to consideration as those submitted by one defendant. Both sides have been confident of success, both have made large investments, each is exposed to serious pecuniary loss whichever way the court decides, and where the equities are thus balanced it seems the duty of the court to decide in favor of those who hold the legal right to the property, and to whose protection, in the language of the Court of Appeals, "an injunction is essential, if not indispensable."

The opinion states that the complainants assert that the lamp at issue is indispensable to any successful system of electric lighting, which is a familiar assertion, but the measure of credit to be given to it is problematical. That other incandescent lamps which are not infringements of the integral vacuum chamber carbon filament lamp of Edison would also give light has been repeatedly asserted, and in the Sawyer-Man case, which was referred to on the argument and the notice of motion, that assertion was fortified by strong affidavits. It is not shown what efforts the defendants have made to supply themselves with lamps not infringements of the Edison; it is not shown that no other lamp will serve their purpose sufficiently to enable them still to use existing plants to furnish light to their customers; if this be the case it would be difficult to see where they have any equities at all. Where the defendants' main contention is that injunction will utterly destroy their investments and force them out of the business of incandescent lighting altogether they should support their contention with proof.

The motion for preliminary injunction was granted, the order to be settled on notice, when suggestions as to the suspension for a reasonable time to adapt fixtures to receive new lamps will be entertained. The judge concludes by stating that he is not inclined to enjoin the use of infringing lamps now in situ.

Alternate Current Wiring.*

BY W. D. WEAVER.

The following tables, calculated from Kennelly's formula,† give the increase of drop due to impedance in circuits carrying alternating currents.

Each table is for a different frequency, as given: the first vertical column of a table gives the gauge of wire, the horizontal column at the top the distance apart of the two wires of a circuit, and the other columns the coefficients by which the drop due to a continuous current should be multiplied to find the true drop if an alternating current is used.

To lower the drop due to impedance it will be seen that large wires should be avoided. In inside work particularly a considerable saving of copper may often be made by dividing the feeders of mains into several circuits.

The following method will enable the tables to be applied with an approximation sufficiently close for practical purposes:

1° By means of one of the usual formulas, calculate, for the given lamps, amperes, or horse power, the size of the wire (in circular mils) as if a continuous current were to be used, and from a table giving the Brown & Sharp gauge equivalent find the nearest corresponding gauge number.

2° Enter with the gauge thus found that one of the following tables which corresponds with the periodicity used and take out the corresponding coefficient.

3° Multiply the original circular mils by this coefficient and find the corresponding gauge again, as above.

4° Repeat the operation of 2°.

5° Multiply the original circular mils by this second coefficient and proceed otherwise as in 3°.

Example.—Amperes, 20; volts, 1,000; drop, 5 per cent.; distance, 4,000 feet; periodicity, 130; distance of wires apart, 18 inches.

1° Substituting in the formula $A=\frac{2{,}150\,L\,C}{a\,E}$, in which A represents circular mils, L the distance, C the current, E the voltage and a the drop in per cent., we have

$$A=\frac{2{,}150\times4{,}000\times20}{5\times1{,}000}=34{,}400$$

or about No. 5 B. & S. gauge.

40 PERIODS PER SECOND.

Gauge B. & S.	Distance between Wires.											
	3″	6″	9″	12″	18″	24″	36″	48″	60″	100′	500′	1000′
0000	1.38	1.55	1.65	1.73	1.85	1.93	2.05	2.13	2.21	3.13	3.64	3.87
000	1.27	1.39	1.47	1.53	1.61	1.68	1.76	1.82	1.90	2.59	2.99	3.10
00	1.17	1.25	1.30	1.34	1.39	1.44	1.50	1.54	1.58	2.13	2.39	2.50
0	1.12	1.19	1.23	1.25	1.30	1.33	1.38	1.41	1.44	1.83	2.06	2.17
1	1.09	1.13	1.15	1.18	1.20	1.23	1.26	1.28	1.30	1.58	1.75	1.83
2	.....	1.09	1.11	1.12	1.14	1.16	1.18	1.20	1.21	1.41	1.53	1.59
3	.....	.....	.....	.....	1.09	1.10	1.12	1.13	1.14	1.28	1.37	1.41
4	.....	.....	.....	.....	.....	.....	.....	.....	1.09	1.19	1.25	1.26
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.12	1.17	1.19
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.11	1.12
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

60 PERIODS PER SECOND.

Gauge B. & S.	Distance between Wires.											
	3″	6″	9″	12″	18″	24″	36″	48″	60″	100′	500′	1000′
0000	1.74	2.03	2.21	2.35	2.53	2.67	2.86	3.00	3.09	4.55	5 35	5.70
000	1.54	1.76	1.90	2.00	2.14	2.25	2.39	2.49	2.57	3.71	4.34	4.58
00	1.36	1.51	1.61	1.67	1.77	1.84	1.95	2.03	2.08	3.00	3.37	3.42
0	1.27	1.37	1.46	1.52	1.60	1.66	1.74	1.80	1.85	2.51	2.89	3 05
1	1.19	1.27	1.33	1.36	1.42	1.46	1.53	1.57	1.60	2.10	2.38	2.52
2	1.14	1.19	1.23	1.26	1.29	1.32	1.36	1.40	1.42	1.79	2.01	2 10
3	1.09	1.13	1.15	1.18	1.20	1.22	1.25	1.27	1.29	1.56	1.72	1.79
4	.....	1.09	1.10	1.12	1.14	1.15	1.17	1.19	1.20	1.38	1.50	1.53
5	.....	.....	.....	.....	1.09	1.10	1.11	1.12	1.13	1.27	1.34	1.38
6	.....	.....	.....	.....	.....	.....	.....	.....	1.09	1.18	1.23	1.26
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.10	1.11

80 PERIODS PER SECOND.

Gauge B. & S.	Distance between Wires.											
	3″	6″	9″	12″	18″	24″	36″	48″	60″	100′	500′	1000′
0000	2.10	2.56	2.82	3.00	3.26	3.40	3.71	3.90	4.06	6.01	7.08	7.54
000	1.86	2.18	2.38	2.51	2.72	2.87	3.06	3.19	3.31	4.87	5.71	6.04
00	1.61	1.81	1.95	2.05	2.20	2.30	2.45	2.56	2.63	3.91	4.42	4.69
0	1.46	1.64	1.75	1.83	1.94	2.03	2.14	2.23	2.30	3.31	3.86	4.46
1	1.32	1.45	1.53	1.59	1.67	1.74	1.84	1.89	1.93	2 66	3.05	3.23
2	1.23	1.32	1.38	1.42	1.48	1.53	1.59	1.65	1.68	2.22	2.53	2.66
3	1.16	1.23	1.26	1.29	1.34	1.37	1.42	1.45	1.48	1.88	2.11	2.43
4	1.11	1.15	1.18	1.20	1.23	1.25	1.29	1.31	1.33	1.62	1.79	1.84
5	.....	1.11	1.12	1.14	1.16	1.17	1.19	1.21	1.23	1.43	1.56	1.62
6	.....	.....	.....	1.09	1.11	1.12	1.13	1.14	1.15	1.30	1.38	1.42
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.13	1.17	1.19

100 PERIODS PER SECOND.

Gauge B. & S.	Distance between Wires.											
	3″	6″	9″	12″	18″	24″	36″	48″	60″	100′	500′	1000′
0000	2.58	3.12	3.44	3.67	4.00	4.24	4.57	4.81	5.02	7.48	8.82	9.40
000	2.20	2.61	2.88	3 05	3.32	3.52	3.75	3.94	4.07	6.04	7.10	7.51
00	1.84	2.13	2.32	2.45	2.64	2.77	2.97	3.11	3.21	4.88	5.47	5.81
0	1.66	1.90	2.05	2.16	2.31	2.43	2.58	2.69	2.78	3.98	4.63	4.91
1	1.48	1.65	1.75	1.84	1.95	2.07	2.18	2.24	2.32	3.23	3.74	3.98
2	1.34	1.47	1.55	1.61	1.70	1.76	1.85	1.92	1.96	2 67	3.07	3 24
3	1.24	1.34	1.39	1.43	1.50	1.54	1.60	1.65	1.69	2.23	2.53	2.67
4	1.17	1.23	1.27	1.30	1.35	1.38	1.42	1.46	1.49	1.88	2.11	2.17
5	1.11	1.17	1.19	1.21	1.24	1.26	1.29	1.32	1.34	1.62	1.80	1.87
6	1.09	1.11	1.13	1.14	1.16	1.18	1.20	1.21	1.23	1.43	1.56	1.62
8	.....	.....	.....	.....	.....	.....	.....	1.09	1.10	1.20	1.26	1.29

130 PERIODS PER SECOND.

Gauge B. & S.	Distance between Wires.											
	3″	6″	9″	12″	18″	24′	36″	48″	60″	100′	500′	1000′
0000	3.25	3.97	4.40	4.70	5.14	5.45	5.89	6.20	6.48	9.68	11.4	12.2
000	2.73	3.29	3.65	3.88	4.23	4.49	4.80	5.05	5.23	7.81	9.19	9.72
00	2.23	2.65	2.90	3.08	3.35	3.51	3.77	3.95	4.09	6.22	7.06	7.51
0	2.00	2.34	2.53	2.68	2.88	3.04	3.24	3.39	3.51	5.10	5.96	6.33
1	1.73	1.98	2.13	2.24	2.43	2.53	2.71	2.79	2.89	4.13	4.79	5.10
2	1.54	1.72	1.84	1.93	2.04	2.13	2.25	2.36	2.41	3.37	3.91	4.14
3	1.38	1.53	1.60	1.67	1.76	1.82	1.92	1.98	2.04	2.77	3.19	3.37
4	1.27	1.37	1.43	1.47	1.54	1.59	1.65	1.70	1.74	2.30	2.62	2.71
5	1.19	1.26	1.30	1.33	1.38	1.41	1.46	1.50	1.53	1.94	2.19	2.29
6	1.14	1.17	1.20	1.23	1.26	1.29	1.32	1.34	1.37	1.67	1.85	1.93
8	.....	.....	.....	.....	1.09	1.13	1.15	1.16	1.17	1.32	1.41	1.45

* From Davis' "Standard Tables for Electric Wiremen," fourth edition (in press). The W. J. Johnston Co., Ltd.

† $f=\sqrt{1+\frac{p^2\pi^2r^4(0.5+2\log\varepsilon\frac{D}{r}}{\mu^2}}$ (Kennelly on "Impedance," *Transactions* of the American Institute of Electrical Engineers, April, 1893.)

2° Referring to Table XXIII., we get the coefficient 1.38.

3° $34{,}400\times1.38=47{,}472$ cir. mils, or between gauges 3 and 4.

4° Referring to Table XXIII. we find the corresponding coefficient to be about 1.44.

5° $34{,}400\times1.44=49{,}536$, or about gauge No. 3.

If thought necessary a third or fourth approximation may be made by repeating the operations indicated in 4° and 5°.

The above rules and tables apply to alternating currents that can be represented by simple sine waves (sinusoids). If the current waves are of more complex type the drop due to impedance will be increased. The above values are therefore minimum values.

The tables are based on the assumption that the current density in the conductor remains uniform. With the frequencies used the error introduced by this assumption is negligible as relates to the calculation of impedances, as well as to the increase of drop due to the unequal distribution of current in the conductor.

An Interesting Phenomenon.

A communication has been received from Mr. Fred. M. Locke, of Victor, N. Y., describing a peculiar phenomenon which he has noticed in two different thunderstorms, and for which he has been unable to find an explanation. He says:

"On the 8th of August, 1888, in a short thunderstorm, and again on Sept. 7, 1893, in a peculiarly long thunderstorm, which lasted from 2:15 in the morning until 4 o'clock in the afternoon, with constant flashing of lightning, I noticed after several flashes large red sparks float away in the air like the sparks from the path of a skyrocket. These sparks appeared to be as large as a man's hat at the nearest point, and gradually diminish in size as the distance increased along the path of the discharge, until they disappeared in the distance. These discharges must have been at least two or three miles away, and, for the sparks to show up so distinct, must have been quite large, as they did not seem bright, but of a deep reddish color; they floated for some six or seven seconds, and only appeared after a discharge that had a peculiar purple color and three distinct flashes in the same path. Each discharge seemed very broad and heavy, but not intense with brightness—soft and mellow, and apparently stood suspended for some few seconds. What could have this matter been that floated away?"

ELECTRICITY AT THE WORLD'S FAIR

THE display made under two of the best known letters in the electrical trade, "C. & C.," has attracted as much attention as any exhibit on the lower floor. It is prettily located beneath the stairs leading to the southeast gallery, flanked on one side by the electric scenic theatre of the Western Electric Company, that seems to be one of the best drawing cards of the Fair, and on the other by a group of automatic phonographs.

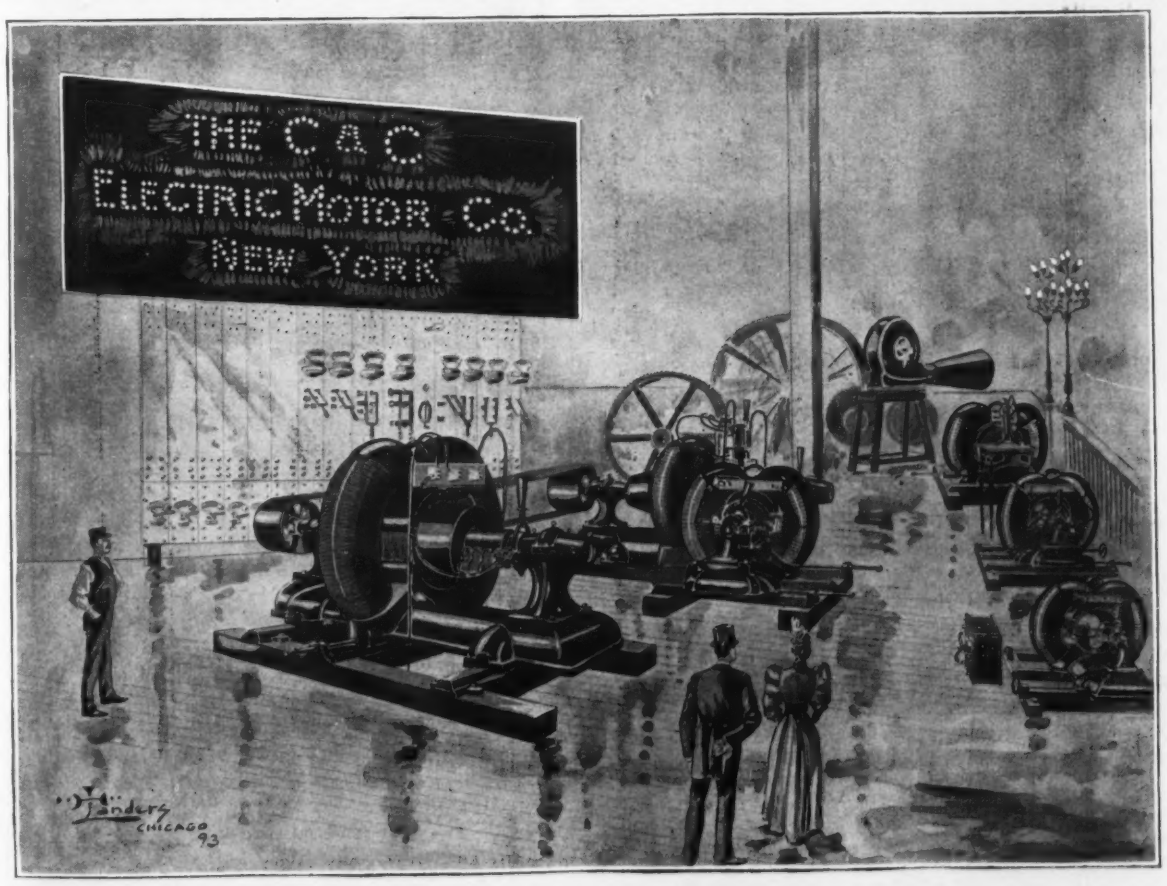
As will be seen from the sketch, a huge illuminated sign hung on the back wall tells the visitor the name and character of the exhibit. The light for the lamps composing this sign is generated from one of the machines in the display; 300 16-c. p. lamps are employed in this one sign. Beneath the sign is situated the switchboard that holds the measuring instruments and connections.

In the display are the following machines: One 50-h. p. motor, driving a 40-kw. compound dynamo, having a maximum capacity of 800 lights—this motor runs continuously at the standard voltage of 500, the generator being the regular 110-volt type; one 10-h. p. motor driving an exhaust fan of 60 inches diameter; one 5-h. p. motor directly connected to a Sturtevant blower; one 10-h. p. mining hoist, shown in operation.

The display is very handsomely set off by an ornamental bronze railing. The entrance way is marked by two great clusters of incandescent lamps grouped on great bronze standards.

The various motors in the space are nearly always operating, and the attendant, Arthur Capen, is kept busy answering the many questions put to him by visitors.

The Machinery Hall display of the company is of even greater importance than the one we have described. It embraces four 500-h. p. generators, driven by Ide engines, and supplying current for the motor which operates the Electricity Building exhibit, and for the electric elevators in the Administration Building. The machines have been in operation almost continuously since the opening of the Fair, and the record of their work is exceedingly gratifying to the officials of the company.



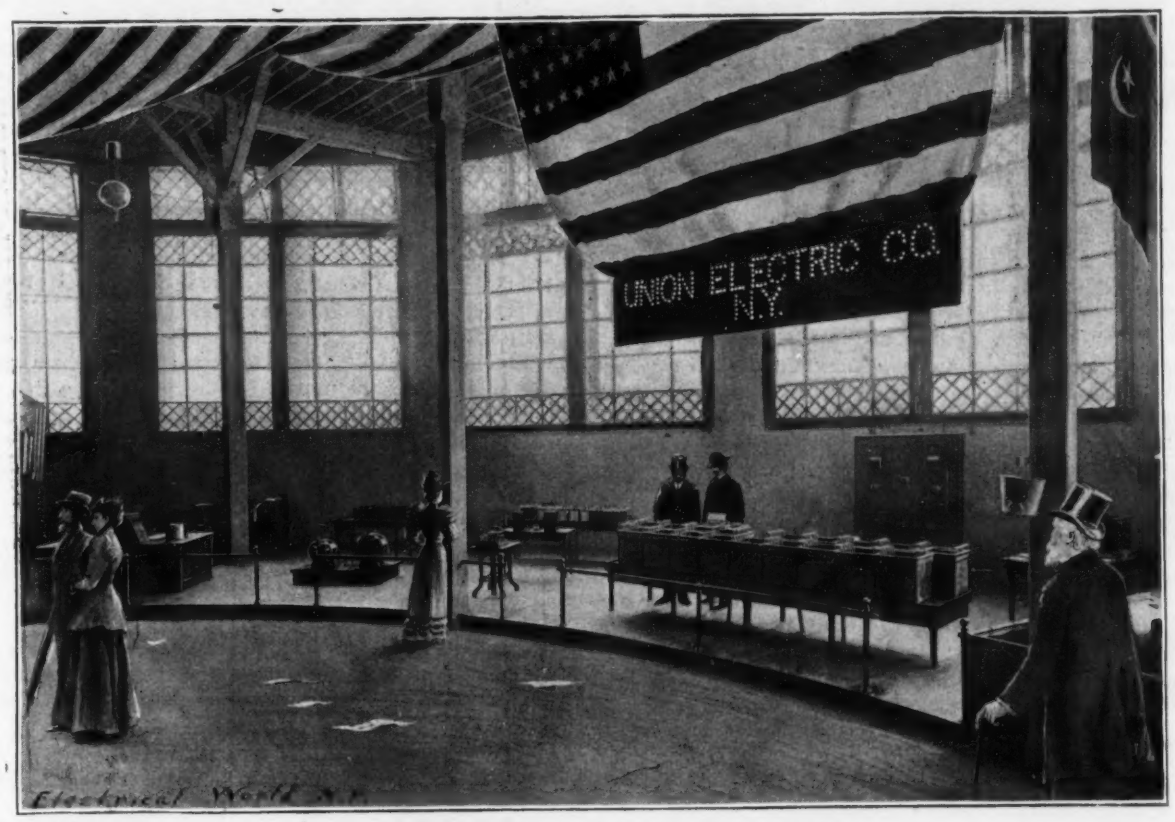
A LARGE COLLECTION OF MOTORS.

UNION ELECTRIC COMPANY.

These words, written in lines of light on a dark background, and suspended in mid-air, tell the visitor that at that point may be found the display of the Union Electric Company, of New York. This space is located in the centre of the semi-circle of exhibits that occupy the northeast ground floor section.

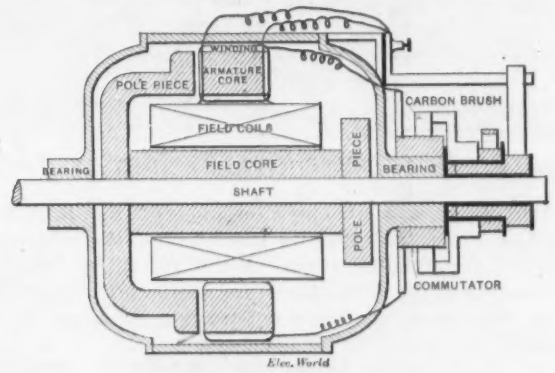
The principal feature of this display is storage batteries of the type manufactured exclusively by the Union Electric Company. The positive plate of this battery is made of a number of thin sheets of lead, inclosed between two stout outer sheets. These are all perforated at once in a press and secured together by numerous leaden rivets. Sometimes there is also a centre sheet of the thicker lead. After the plate is made in this manner, it is "formed" by the action of a charging current, which operation converts the thinner inside sheets completely into peroxide of lead, leaving the thick ones (which are but superficially affected) as permanent retaining walls and supports. The transverse holes, which remain open, give free access of solution to the interior of the plate. The working surface thus obtained is much greater than the outer flat sides would afford. No peroxide can drop out, and the plate, however thick, is discharged uniformly throughout.

The negative plate is made of an amalgam of zinc and mercury, deposited electrolytically upon a copper plate. The zinc employed is partly dissolved during the discharge of the cell, and redeposited upon the copper plate by the charging current, thereby avoiding any loss. The copper support gives permanence and high conductivity to what would otherwise be a perishable plate. The mercury serves to prevent local action, as it spreads by capillary action over the whole surface. Each copper sheet has a number of large perforations through it, giving a better hold to the soft amalgam, and it is long enough to bend into a U form, so as to come opposite to both sides of the lead plate.



AA EXHIBIT OF STORAGE BATTERIES.

It will be observed that while the principles of storage battery construction are in general followed out in this type of cell, there is a marked difference between them and other makes. Instead of the well known gratings or "grids" formed to hold the active material of other cells, the absorbent material in the Union cell is solidly inclosed between continuous sheets, so that it cannot work out. The plates are very strong, and for this reason do not warp. Their weight in proportion to capacity is very low, and the clearance space very large.



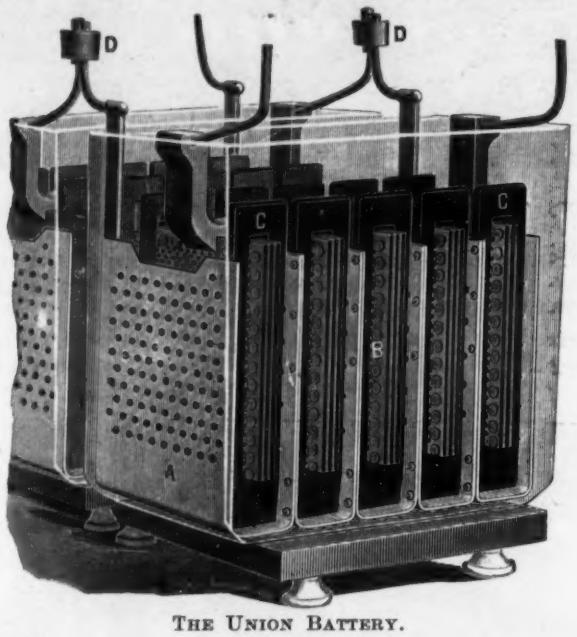
THE MAIN MOTOR.

In the exhibit the two types of cell manufactured by this company are shown to advantage. For all capacities of less than 250 ampere-hours a lead positive and zinc negative are used, while for cells of greater capacity both lead positive and negative are used, the construction of the negative plate being practically the same as that of the positive plate above described, the central sheet of heavy lead being omitted.

The main battery shown in the exhibit has a capacity of 1,000 ampere-hours, discharging at a pressure of 36 volts. It supplies current for lighting the sign to which reference was made above. The lamps on the sign are of 5

c. p., 10 volts, and are connected two in series. The letters can be lighted separately, successively, or all at once, by means of a motor and revolving switch designed for the purpose. The battery is charged from a motor-generator loaned by the Riker Motor Company.

On two tables in the rear of the exhibit are batteries of 50 to 250 ampere-hours respectively. The former supply current for the telegraph instruments in The E. S.



The Union Battery.

Greeley & Co. display, and the testing instruments of Queen & Co., while the latter furnish current to operate the 29 automatic Edison phonographs located close by.

A number of cells designed for medical work, and handsomely encased in mahogany and oak cases, are also shown. In connection with one of these is exhibited a 5-c. p. incandescent lamp with aluminium frame and reflector used by physicians and surgeons.

Two motors of particular interest are shown. They are of an entirely new design and have created a good deal of comment. There is no movable wire in the entire machine.

Both motors are of the same type. The armature is a stationary Gramme ring of large diameter. The core is laminated and toothed, and is made of a thin ribbon of iron coiled in a spiral with thin paper between the layers. The windings are of flat copper tape insulated from the core with mica.

The pole pieces are two flat bars at right angles to each other, and at opposite ends of the field core, which latter is shrunk on the shaft of the motor and passed through the centre of the armature. The bars which form the pole pieces are somewhat expanded at the ends, each pole piece extending over about 5-12 of the circumference of the armature.

The field coils, of which there are two, one shunt and one series, are stationary, being held by a framework inside of the armature. The field winding is compound, and not differential. The armature windings are connected to a stationary commutator of ordinary design. the carbon brushes being held on revolving arms attached to the shaft. The current is supplied to the brushes by means of insulated rings mounted on the shaft and connected to the brush arms, the current being fed to the rings by flat copper brushes connected to the poles of the machine. The carbon brush holder is unique, utilizing the centrifugal force of revolution of the brush arm to furnish the proper degree of contact.

The shaft, field core, pole pieces and commutator brushes are the only revolving parts of the machine.

The smaller motor exhibited is designed for 110 volts. It develops 3 h. p. with 25 amperes, running at 800 revolutions. It has an aluminium frame, and weighs 312 pounds, being probably, it is claimed, the lightest motor of this capacity ever manufactured. It has been run for several hours at 40 amperes, developing 4 h. p. without overheating. The larger motor is designed for 220 volts. It develops 5 h. p. with 22 amperes, running at 500 revolutions. The frame is of brass, and the motor weighs 640 pounds. The following advantages are claimed for this type of motor: Slow speed with large torque, light weight, and no moving wire.

Associated with the Union Electric Company is the display of

THE FIBRE CONDUIT COMPANY,

exhibiting a new conduit for underground service. This conduit is weather proof, a non-conductor of electricity, and is claimed to be unaffected by the attacks of acids or alkalies. It is considerably cheaper than iron, and, being only about one-quarter its weight, the cost of transportation and handling is comparatively small. Mr. J. S. Douglas is in charge of the exhibit.

THE DISPLAY OF L. J. WING & CO.

If there is any one thing that will ever live fresh and cool in the memory of World's Fair visitors it is the soothing comfort they received from the breezes sent forth by the thousands of electrical fans scattered throughout the Fair. Not only in Electricity Building have visitors enjoyed the refreshing zephys, but in other great buildings, principally in the Manufactures Building. It is not strange, therefore, that the greatest fan exhibit at the Fair, in fact, has attracted no end of attention and received many compliments. Such is the exhibit of L. J. Wing & Co., located in the northeast corner of the ground floor.

A motor of four h. p., located in one corner of the exhibit, drives a 48-inch exhaust fan placed horizontally in the ceiling, and one of 36 inches placed in the front wall at the left of the entrance. From the same shaft is also driven one 12-inch, and two 18-inch fans standing on the edge of the roof. One of the latter is connected by means of sheet iron pipes with a forge, a steam vat and two closets.

The pavilion is divided into three communicating compartments. In the right hand compartment is located the switchboard from which all the fans in the exhibit are controlled. The fans on the roof demonstrate their power by opening and closing the doors of the compartments.

One of the features of special interest to the visitor is a ceiling fan with very long blades which keeps the air in a gentle agitation. On a table close by is found a 12-inch revolving fan to insure the absolute and continual circulation of the air.

Extending the entire length of the display, and forming a sort of railing to demand attention from the passer-by, is a line of exhaust fans ranging from two feet in diameter up to five feet, each succeeding fan being six inches higher than its neighbor.

In the left hand corner of the exhibit is the office of the firm's representative, Mr. F. H. Gottlieb, who has done a great amount of work to insure the complete success of his exhibit.

THE EDDY ELECTRIC MANUFACTURING COMPANY.

There is a striking similarity between the various electric motor exhibits in Electricity Building in the manner of their arrangement. In nearly every case the largest machine in the display is used as a motor to drive another as a generator, and this, in turn, supplies current to smaller motors. This is a very good way to demonstrate the use of the machine when used as a motor and as a generator.

In the display made by the Eddy Electric Manufacturing Company the foregoing idea is well carried out. A 50-h. p. type "C" motor figures in the interesting group shown in the sketch. In its operation it is simple, silnet and efficient. Its speed is almost constant at all loads, and no sparking is noticed at the commutator.

This motor is used to drive a 45-kw. generator of the well known Eddy "E" (multipolar) type. A 15-h. p. type "H" machine operates a plater having a capacity of 6,000 gallons of plating solution, to use the expression of electroplaters.

The exhibit is well located, and so designed that each of the different machines can be easily inspected from a distance.

F. C. Ross, the New York manager of the company, has had charge of the exhibit since the opening of the Fair.

Moonlight Tables for November, 1893.

Herewith we give Mr. H. W. Frund's tables of lighting hours for the month of November under his modified form of moonlight schedule. It will be noticed that they have been somewhat simplified:

TABLE NO. 1. Standard Moonlight. Philadelphia System.				TABLE NO. 2. Frund's New Moonlight System.			
Date.	Light.	Date.	Exting.	Date.	Light.	Date.	Exting.
1	5:30 P. M.	1	1:10 A. M.	1	5:30 P. M.	1	1:10 A. M.
2	5:30	2	2:20	2	5:30	2	2:20
3	5:30	3	3:30	3	5:30	3	3:30
4	5:20	4	4:30	4	5:20	4	4:30
5	5:20	5	5:40	5	5:20	5	5:40
6	5:20	6	5:40	6	5:20	6	5:40
7	5:20	7	5:40	7	5:20	7	5:40
8	5:20	8	5:40	8	5:20	8	5:40
9	5:20	9	5:40	9	5:20	9	5:40
10	5:20	10	5:40	10	5:20	10	5:40
11	5:20	11	5:40	11	5:20	11	5:40
12	5:20	12	5:40	12	5:20	12	5:40
13	7:30	13	5:40	13	5:20	13	5:40
14	8:30	14	5:50	14	5:20	14	5:50
15	9:30	15	5:50	15	5:20	15	5:50
16	10:40	16	5:50	16	5:20	16	5:50
17	11:40	17	5:50	17	5:20	17	5:50
18	12:50 A. M.	18	5:50	18	12:50 A. M.	18	5:50
19	2:00	19	5:50	19	2:00	19	5:50
20	3:10	20	5:50	20	5:10 P. M.	20	12:00 M.
21	4:30	21	5:50	21	5:10	21	12:00
22	No light	22	No light	22	5:10	22	12:00
23	No light	23	No light	23	5:10	23	12:00
24	No light	24	No light	24	5:10	24	12:00
25	5:10 P. M.	25	7: 0 P. M.	25	5:10	25	12:00
26	5:10	26	8:30	26	5:10	26	12:00
27	5:10	27	9:50	27	5:10	27	12:00
28	5:10	28	11:00	28	5:10	28	12:00
29	5:10	29	12:10 A.M.	29	5:10	29	12:10 A. M.
30	5:10	30	1:20	30	5:10	30	1:20

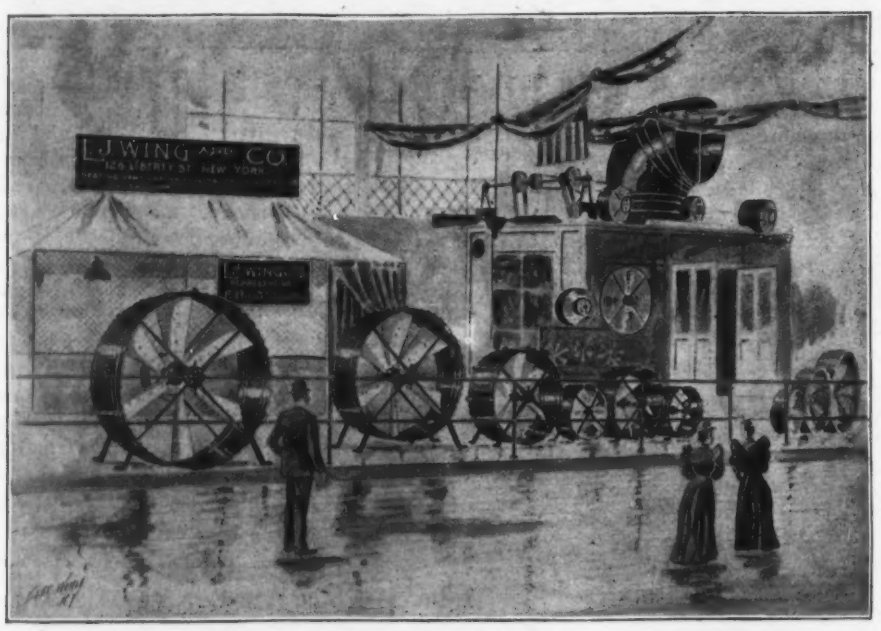
Electrical Decorations.

At the opening of Wechsler & McNulty's new store in Brooklyn electricity played an important part, the Edison Decorative and Miniature Department, of Harrison, N. J., having been given charge of the illuminated decorations.

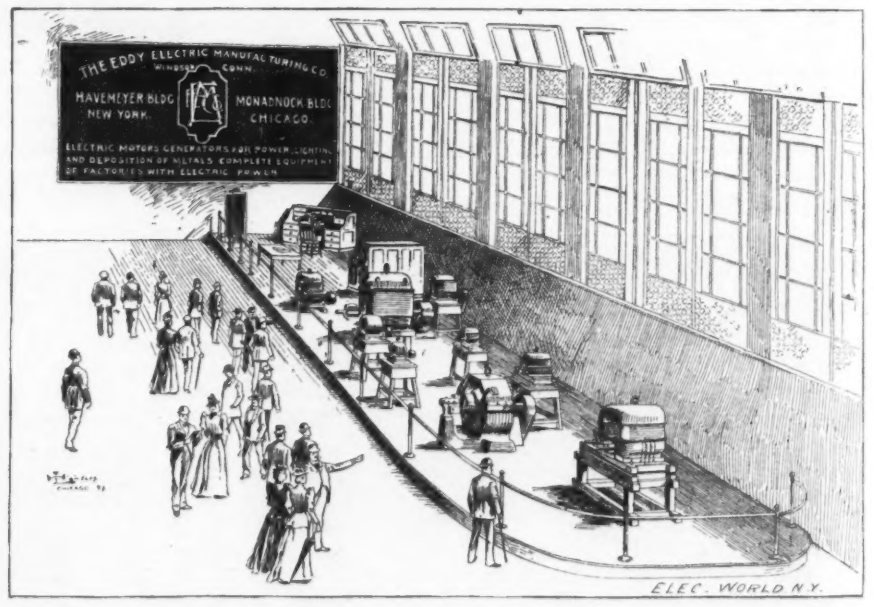
Over the front of the store on the Fulton street side there are two signs forming an arch. These are made up of letters composed of miniature incandescent lamps, which can be changed very quickly, so as to form other combinations and words. In these two signs there are about 560 miniature incandescent lamps, giving almost 1,000 candle power in the aggregate.

Over the door, on the second floor, in the corner window, was an automatic electrical time clock, which has never before been exhibited. The figures on this clock are composed of miniature lamps, about 225 in number. By an automatic device these lamps are illuminated about four times in every minute, thus making it easy to see the time, and presenting a brilliant spectacle.

On the ground floor of the store, in the third window, on the Fulton street side, next to the main entrance, were three brilliant electrical devices. In the centre was a wheel with about 300 incandescent lamps. This wheel was constantly revolving, throwing out different patterns, producing a brilliant kaleidoscopic effect. On either side of this wheel were head, wings and claws of a dragon, also studded with electric lamps. These fixtures being silvered, made a very brilliant effect, throwing into contrast the eyes and tongues of the dragons all aflame.

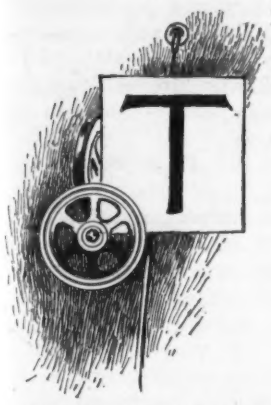


AN EXTENSIVE EXHIBIT OF VENTILATING FANS.


THE EDDY ELECTRIC MANUFACTURING CO.
WINDSOR CONN.
MAVEMEYER BLDG NEW YORK.
MONADNOCK BLDG CHICAGO.
ELECTRIC MOTORS GENERATORS FOR POWER, LIGHTING AND DEPOSITION OF METALS COMPLETE EQUIPMENT OF FACTORIES WITH ELECTRIC POWER
ELEC. WORLD N.Y.

CORNER WHERE THE EDDY MOTORS ARE SHOWN.

Meeting of the New York Street Railway Association.



THE eleventh annual meeting of the Street Railway Association of the State of New York was held in the rooms of the Chamber of Commerce at Rochester, N. Y., on Sept. 19, 1893. A goodly number of street railway men, and others more or less connected with this kind of work, were present, and the proceedings of the Association were followed with interest throughout.

The president of the association, Mr. C. Densmore Wyman, was unfortunately not able to be present, being detained in Chicago by his duties as manager of the Electric Launch and Navigation Company at the World's Fair Grounds. A letter was received from him, expressing his regret that he could not attend, and assuring the association that he was deeply interested in its work.

Vice-President D. B. Hasbrouck was called to preside, and made a brief opening address. He indulged in reminiscences of the New York of years ago, calling attention to its wonderful development, and especially to the advances made in traction.

The report of the Executive Committee was then presented, showing that five companies had joined during the year, and that three had been consolidated with a company already a member, leaving the present membership 28 companies. In referring to the subject of electric traction the committee said: "We are glad to note the rapid development of the overhead system in Brooklyn. An object lesson as to character of construction, equipment and operation by electricity is there being given to the country and the world at large that will do much to pave the way for the successful introduction of electric traction in those cities where it has not yet obtained a foothold."

The committee also congratulated the association on the fact that during the last session of the State Legislature not a single bill detrimental to street railway interests had been passed. Touching upon the business outlook the following words were used:

"The street railway business is a delicate financial meter that indicates with certainty the financial condition of a people. In proportion to the prosperity of the people is our business successful; and the converse is equally true. Judged by this infallible test, therefore, we are assured that the worst of the country's financial troubles and business depression is passing away.

In closing the report a fitting tribute was paid to the memory of the late John Stephenson.

The treasurer's report, which was next presented, showed that during the past year the receipts amounted to $902.49, while the expeditures reached the sum of $678.66, leaving a balance of $223.83.

One of the features of the meeting was to have been a report on "Recent Improvements in Cable Traction," by Mr. George W. McNulty, engineer of the Broadway cable Road, of New York City. This was not presented, and a letter was received from Mr. McNulty explaining that, although the road had been in operation for several months, it had really been started before they were entirely ready, and many of the improvements had not been made, while others had not been tried for a sufficiently long time to give evidence of their value. It was apparently impossible to present a report of any importance at this early stage, but such a paper was promised next year.

The next business was the report of Mr. T. J. McTighe on "Return Circuit for Electric Railways," which was read by the secretary.

REPORT OF THE COMMITTEE ON "THE RETURN CIRCUIT OF ELECTRIC RAILWAYS."

Mr. McTighe first spoke of the difficulties he encountered in collecting data upon this subject; every one seemed to hold a different opinion, and he was finally obliged to give up that method and rely almost entirely upon his own experience and calculations. The return circuit is a most important factor in any electric railway system, and has not received the consideration it deserves. The earth return, Mr. McTighe thought, could not be relied upon; in dry weather and when frost is in the ground it could be left out of the culculations almost altogether. He believed that the track rails could be used largely for a return circuit, and that in most cases a supplementary wire was an unnecessary expense, and would soon be discarded altogether. He made a large number of calculations as to what should be the total resistance per mile of the return circuit under different methods of construction; in making these calculations he eliminated the conductivity of the earth, for reasons just stated, and also the conductivity of the fishplates, on the ground that the comparatively small areas of contact were too much oxidized to be of real use. He also eliminated such refinements as changes of temperature, moisture, etc. The figures are based on a ratio of six to one in comparing the resistance of an ordinary soft steel rail with that of commercial copper. The form of the rail bond is also left out of considertion, as it was very difficult to calculate its influence.

The following are some of the reasons why Mr. McTighe believed that a supplementary ground wire was an unwise extravagance:

In steel rails it is usually said that every ten pounds weight per yard means one square inch of cross-sectional area. And every square inch of such area can be brought to terms of copper by dividing by six. For example, take the average city railway rail as being a 70-pound girder. Its area is substantially seven square inches, and the four rails of a double track make 28 square inches, equal to a single steel bar four inches thick by seven inches wide. This is electrically equal to a bar of copper having 4.66 square inches area, or, in other words, a copper conductor one inch thick and almost five inches wide. With such a magnificent path for the returning current, does it not seem absurd to supplement it with a No. 0 wire, whose area is that of a rod a little over a quarter of an inch square? The above rail resistance per mile to be but .0086 ohm, while that of the No. 0 wire is just 60 times greater.

Calculating in like manner for some usual weights of rails the following are obtained:

TABLE I.—DOUBLE TRACK.

Size of rails.	Total sectional area.	Equivalent in copper.			Resistance per mile.
		Area.	Thick.	Wide.	
50 lb.	20 sq. in.	3.33 sq. in.	1 in.	3.33 in.	0.0121 ohm.
60 "	24 "	4.00 "	1 "	4.00 "	0.0101 "
70 "	28 "	4.66 "	1 "	4.66 "	0.0086 "
80 "	32 "	5.33 "	1 "	5.33 "	0.0075 "
90 "	36 "	6.00 "	1 "	6.00 "	0.0067 "

As it would be tedious to carry all these into further comparisons, the analysis will be carried out mainly on the 70-pound rail, with one reference to the big 90-pound rail now being extensively used in large cities.

TABLE II.—70-LB. RAIL, DOUBLE TRACK.

Case.	Description.
1	No. 4 cop. bonds, connectors and two No. 0 cop. supplementaries.
2	No. 4 cop. connectors to rail ends, two No. 0 cop. supplementaries.
3	36 inch No. 0 iron bonds, single, No supplementary.
4	36 " " 0 " " double " "
5	36 " " 0 copper bonds, single. No supplementary.
6	12 " " 0 " " " " "
7	36 " " 00 " " " " "
8	12 " " 00 " " " " "
9	36 " " 000 " " " " "
10	12 " " 000 " " " " "

90-LB. RAIL, DOUBLE TRACK.

Case.	Description.
11	No. 4 cop. connectors to rail ends, four No. 0 supplementaries.
12	12 inch No. 0000 copper bonds, double, no supplementary.

Cases 1, 2 and 11 are given as representing the system on which probably a large majority of electric railways have been constructed. A few roads have the supplementary doubled along both tracks, and a few have used slightly larger connecting wires than No. 4 B. & S. The West End and the Brooklyn City Railroad companies laid their tracks with double supplementary copper wires (No. 0 B. & S.), but found them totally inadequate, and now have put up many miles of huge return feeders or mains at great cost. Even these are inadequate. In Brooklyn these return mains (500,000 circular mills) are, when possible, suspended on the elevated railroad structure. Occasionally the insulation scrapes off and the return main makes contact with the ironwork. Heat enough is developed at this leak to soften the insulation for many feet, thus showing that the resistance of the main return is still too high.

Taking the various cases set forth in Table II. another table has been constructed, and for the sake of fair comparison calculations have been made on the same basis of elimination as previously noted.

TABLE III.—CHARACTERISTICS PER MILE, DOUBLE TRACK.

Case number.	Total R of rails.	Total R of rail bonds.	Total R of track circuit.	Fall of potential for 200 amp.	Total energy expend'd thus in track circuit.	Cost of such per year at $100 per kilowatt	Approx. cost of track circuit material
	Ohm	Ohm.	Ohm.	Volts.	Watts.	Dols.	Dols.
1	.0086	.0335	.0362	7.24	1,448	144.80	700.00
2	.0086	.0671	.0586	11.72	2,344	234.40	700.00
3	.0086	.0796	.0882	17.64	3,528	352.80	90.00
4	.0086	.0398	.0484	9.68	1,936	193.60	180.00
5	.0086	.0133	.0218	4.36	872	87.20	180.00
6	.0086	.0044	.0130	2.60	520	52.00	115.00
7	.0086	.0105	.0191	3.82	764	76.40	200.00
8	.0086	.0035	.0121	2.42	484	48.40	130.00
9	.0086	.0083	.0169	3.38	676	67.60	220.00
10	.0086	.0027	.0113	2.26	452	45.20	150.00
11	.0067	.0335	.0306	6.12	1,224	122.40	1,250.00
12	.0067	.0011	.0078	1.56	312	31.20	432.00

Of course, in localities favored all the year round with wet ground, the above table would be seriously astray; but the table is based upon the most unfavorable condition, namely, earth frozen hard for two or three feet deep, and earth conductivity practically nil.

Take cases Nos. 2 and 6 in Table III. The former is, no doubt, used by many members of this association. No. 6 is the system of track circuit of the Atlantic Avenue Railroad, in Brooklyn, N. Y. No. 2 has a total track resistance of .0586 ohm, and costs, for material, about $700 per mile, while No. 6 has a total track resistance of but .0130 ohm, and costs, for material, only $144 per mile. In other words, No. 6, in point of efficiency, is four and a half times a better electric circuit than No. 2, while costing just about one-fifth as much. In roads likely to have extreme heavy traffic, case No. 11 has been adopted, there being four No. 0 supplementary copper wires and the ordinary copper rail bonds or connectors; being thus merely an enlargement of No. 2, and used in connection with 90-pound rails. In case No. 12, the 90-pound rails are also used, but there are no supplementary wires, and each joint of the rails is supplied with two rail bonds of No. 0000 copper wire, each only 12 inches long. Comparing results, it is evident that case No. 12 is, electrically, about four times a better circuit than No. 11, while costing only about one-third as much.

Now let case No. 12, as it stands, be compared with case No. 11, but adding to the latter two 500,000 circular mils overhead returns connected heavily to the track circuit at frequent intervals. In case No. 11 the total track circuit resistance is .0306 ohm; that of the two 500,000 circular mils feeders about .0545 ohm; and the combination circuit measures about .0196 ohm. The cost of the two feeders (insulated) per mile of double track roads would be approximately $2,800, to which we add the $1,250, cost of track circuit in case 11, making $4,050. In short, though case No. 12 gives almost three times as efficient an electric circuit as the new case No. 11, the latter costs almost ten times more than No. 12. And yet the West End and the Brooklyn City Railroad companies pin their faith in a circuit like case No. 11.

A glance at the sixth and seventh columns of Table III. is rather instructive. In a medium city system, operating 20 miles of double track, the company which uses case No. 2 will pay several thousand dollars per year for the energy wasted in the return circuit, while the company using No. 6 or No. 8 or No. 10 will pay but a trifle in comparison, and save nickels by the quart. It would to-day well repay any company using copper supplementary wire to rebond its tracks on a basis of perennial low resistance, because, on the average, it would save the cost of such change in one year. And the same applies to those using iron rail bonds.

The electrolytic decomposition of the rails when the earth is relied upon as the major part of the return circuit is another phase of the question to be considered. The soil under the paving of the ordinary horse car line is the cause of a great deal of direct electrolytic decomposition. As an extreme case, it would scarcely be an exaggeration to assume that in Tremont street, Boston, or Fulton street, Brooklyn, there is a massing of slowly moving cars, amounting to, say, 100 for one mile of double track. Let the rails used be 70-pound girder, and for the current, say, about 20 amperes per car for 15 hours per day would be a fair average. $100 \times 20 \times 15 \times 365 = 10{,}950{,}000$ ampere-hours per year. If all this went back to the generator by way of the earth, the decomposition of the rails every year would be 7,665,000 grammes, or about 17,000 pounds of iron—nearly eight tons lost from the mile of double track in one year. This cannot be entirely avoided, but can be reduced to a minimum by giving the track circuit as great an electrical value as possible, and might be retarded by dipping the rails before laying similarly to gas and water mains.

In abandoning the earth return troubles with gas and water pipes and telephone circuits would largely be avoided, and yet there would be as much safety from lightning as at present.

Admitting that it is advisable to obtain from the track structure as great a conducting power as possible, the question of how it should be bonded then arises.

Mr. McTighe then considered the various types of rail bonds which had been proposed and used and showed the objectionable features of each. He thought that the solid one-piece bond was preferable to all others; it was a patent of his own, but he believed that he was looking at the question from a broad and disinterested standpoint. This solid one-piece rail bond is merely a wire with extension curves at its ends, on each of which a heavy shoulder is swaged from the wire itself, so that both the rivet ends thus formed and the intermediate wire are all one solid integral piece. From rivet to rivet there can be no failure of contact, except by forcible rupture or total corrosion, and there can be no failure of contact between bond and rail, because when the rivet end is properly headed up, the connection made is perfectly watertight and airtight, and is proof against pounding and vibration. There is no solder required, no parts to shake loose, and there is no restriction in size of wire, as the bond can be made of No. 4 wire, and it can be made of No. 0000, and larger, if desired.

The great majority of rail bonds used span around the fishplates, which nowadays are quite long. This is a mistake. Table III. will show what a difference there is in resistance in the track circuit, as between 36-inch and 12-inch bonds. The 12-inch bond has the advantage in the total track resistance of from 40 per cent. to 50 per cent. A 12-inch solid bond, with its expansion curves, makes a distance between rivet centres of about eight inches. Electrically considered, it does not matter what part of the rail end is used for bonding. The holes can be drilled through the flat "tram" or through the floor of the rail, four inches from the end, just as readily as through the web or stem. In girder rail it is preferable to drill the holes through the flat tram, taper ream the holes from above, and deeply countersink; then pass the rail bond up from beneath, and head up the ends till the taper and countersink are completely filled. This method has one great advantage, in allowing every rail bond to be inspected at any time without disturbing the paving. The tracks of the Atlantic Avenue Railroad, in Brooklyn, were bonded in this way with No. 000 copper bonds, eight inches long between rivet centres, and they have given entire satisfaction. Rail bonds should, after being applied, be either heavily coated with shellac and asphaltum, as practiced by Mr. Wason in Cleveland, or have a grooved strip of wood filled with asphaltum slipped around while the compound is soft. This will prevent corrosion.

Another important element of the return circuit in such roads as do not pass the power house is the main return. There should be a heavy connection from the generator or switchboard by the shortest route to the rails, a course which is generally adopted, but aside from the conductor is apt to be small. Old rails can be advantageously used for the return in many cases.

Mr. McTighe was, therefore, led to the conclusion that the best return circuit is that which complies with the following requirements: 1. Intrinsic resistance low enough to need no help from earth. 2. Utilization, to the utmost practical extent, of the rails as the return conductors. 3. Rail bonds of the heaviest practicable size. 4. Rail bonds of the shortest possible length, consistent with due allowance for expansion and vibration. 5. Rail bonds made of a single piece of wire with integral rivets. 6. Rail bonds tightly riveted to the rails through holes freshly reamed immediately before bonding. 7. Rail bonds so placed as to permit convenient inspection. 8. Rail bonds protected against corrosion. 9. A very liberal use of heavy cross bonds from rail to rail direct, and, in double track, extra heavy cross bonds connecting the two inside rails. 10. An underground main or trunk return from power house to track, and there connected to each line of rails, and low enough in resistance to carry the maximum current with but a nominal drop in potential.

Mr. W. W. Cole, of Elmira, in the discussion which followed, questioned whether it was expedient to use old rails for return circuits; the old rails were worth $9 or $10 per ton, and it was necessary to bond them two or three times at each joint, so that it was a matter of

some doubt as to whether the rails could not be sold for enough to purchase a supplementary wire, which would be far better. Mr. Cole further stated, in reply to an inquiry, that he had found that it was better to use copper for a return circuit in a gravelly soil, while iron was better in a soil of clay and quicksand.

Mr. T. H. Fearey stated that he had been informed by the engineer of the Rochester Railway Company that they had used from three to five old rails for the return circuit, bonding them with iron and copper wire, but that contraction in the winter and trouble from the frost had caused them to take up the old rails and substitute a copper supplementary wire.

The vice-president then appointed Messrs. Watson, Richardson, Sr., and Williams as a nominating committee, and the following gentlemen were recommended by this committee as officers of the association for the ensuing year: President, D. B. Hasbrouck, New York City; first vice-president, G. Tracy Rogers, Binghamton; second vice-president, James H. Moffitt, Syracuse; secretary and treasurer, W. J. Richardson, Brooklyn. Executive committee—John N. Beckley, Rochester; Daniel F. Lewis, Brooklyn, and Charles Cleminshaw, Troy.

The association then adjourned to meet in Syracuse the third Tuesday in September, 1894.

The Rochester Railway Company extended an invitation to those attending the meeting to take special cars to the Bartholomew Brewery, where the plant was inspected and luncheon served. The visitors then went to Charlotte, Lake Ontario Beach, where a liberal dinner was provided at the Cottage Hotel, accompanied by orchestral music, singing by the Tremont Quartet, recitations, etc. General speechmaking was indulged in and an enjoyable evening was spent.

THE ATTENDANCE.

The following delegates were present: G. Tracy Rogers, president of the Binghamton Railroad Company, Binghamton; Wm. Richardson, ex-president, and Wm. J. Richardson, secretary, of the Atlantic Avenue Railroad Company, Brooklyn; Henry M. Watson, president of the Buffalo Railroad Company, Buffalo; W. W. Cole, general manager of the West Side Railroad Company, Elmira; H. Bergholz, secretary and treasurer of the Ithaca Street Railway Company, Ithaca; D. B. Hasbrouck, secretary of the Houston, West Street and Pavonia Ferry Railroad Company, New York City; C. A. Williams, secretary, William Rosborough, superintendent, and Albert Green, electrician of the Rochester Railway Company, Rochester; C. A. Derr, general superintendent of the Rochester Electric Railway.

The following gentlemen were also present: W. J. Clark, General Electric Company, New York; J. S. Crider, Washington Carbon Company, Pittsburgh, Pa.; H. C. Evans, Johnson Company, New York; D. T. Evarts, Simplex Electric Company, Chicago; Thomas H. Fearey, General Electric Company, Buffalo; Arthur W. Field, Peckham Motor Truck and Wheel Company, Kingston; R. Gerry, American Iron and Steel Company, New York; H. J. McCormick, Schaffer Manufacturing Company, Rochester; Elmer P. Morris, General Electric Company, Indianapolis, Ind.; A. D. Newton, Eddy Manufacturing Company, Windsor, Conn.; J. F. Ostrom, Pennsylvania Steel Company; Philadelphia, Pa.; D. W. Pugh, John Stephenson Co., New York; John S. Pugh, Baltimore Car Wheel Works, Baltimore; F. C. Randall, J. G. Brill Company, Philadelphia, Pa.; F. D. Russell, Rochester Car Wheel Works, Rochester; John Taylor, Taylor Electric Truck Company, Troy; A. C. Vosburgh, New Process Raw Hide Company, Syracuse; H. W. Weller, General Electric Company, New York; C. B. Wyman, Central Electric Heating Company, New York; Charles J. Bissell, Rochester, and C. C. Woodworth, Rochester.

The Toronto Meeting of the Canadian Electrical Association.

EMBERS of the Canadian Electrical Association gathered in the Industrial Exhibition Association Building at Toronto at 2:30 p. m. on Sept. 12, when the third convention of this association was declared open. President J. J. Wright occupied the chair and delivered a graceful opening address, in which he congratulated the members on the advance made by the association, and briefly referred to the wonderful progress in the applications of electricity. He expressed a hope that the association would establish a standard of illuminating power for arc lights, which should be recognized, throughout the Dominion at least, as authoritative and final, and would become known as the Canadian Electrical Association standard. Reference was also made to the Hurontario ship canal, which was a scheme to connect Lakes Huron and Ontario by canal and utilize the water power for electric light and power purposes.

Secretary-Treasurer C. H. Mortimer then presented his report, calling attention to the bill which had been introduced at the last session of the Dominion Parliament, providing for the inspection of electric lighting, and which was withdrawn by the government through the influence of the president of the association and Mr. A. B. Smith.

During the past year the membership of the Association has increased from 109 to 133. A statement of the receipts and disbursements for the year showed that there was a balance of $103.48, which added to the funds received since the end of last June amounted to $275.23. The report was adopted.

The report of the committee appointed to collect statistics was submitted, but it was incomplete, and the committee asked for further time to finish it, which was granted.

The first paper of the meeting was then read by Mr. F. C. Robertson, the subject being

SOME OF THE CAUSES OF INTERRUPTION TO TELEGRAPH CIRCUITS.

Mr. Robertson, after stating that the troubles usually met with in the operation of telegraph circuits were the "break," the "ground" and the "cross," briefly described in a simple way the various causes to which each of the difficulties could be attributed, and suggested the means by which they could be avoided, or at least remedied. In conclusion he emphasized the necessity of a thoroughly constructed line in which only first-class material was used and the importance of so placing the poles and cross arms that they would be least subject to injury of any kind. Constant inspection by vigilant linemen would often prevent the occurrence of these common troubles, and repairs promptly made would reduce the liability of the lines being interrupted to a minimum.

The session was closed by the reading of the paper of Mr. A. C. McCallum on

TURBINE WATER WHEELS.

After tracing the history of the turbine water wheel from its invention by Faurneyron in 1827, and its introduction on this continent by Mr. Elliott Morris, a Pennsylvania engineer, Mr. McCallum proceeded to describe the essential elements of the turbine and to point out the various types which are now in use. In the construction of the buckets, which is an important feature, the American inventors' plan can only be called that of the "cut and try" method; while the grades of wheels constructed in Europe have been mainly imporved by careful and scientific study. From results that have been obtained from wheels of all shapes of buckets, that shape of which the bucket at its upper part recedes from the water, gradually curving downward and then receding backward in a direction at almost right angles to that of the bucket's upper part, has given the best results. Mr. McCallum stated that experience has shown that wheels in which the buckets are of one homogeneous casting are the best that have yet been produced. Wheels in which the buckets, together with the joint, are made separately from the cone or hub, either of cast or wrought iron, are decidedly the worst kind. It is essential that the discharging orifices of the buckets be of uniform area.

The question of the regulation of turbines is a most important one, and many different devices have been produced, a large number of which are in use at the present day. Mr. McCallum thought that the Register gate, which consists of a ring or cylinder fitted concentric between the stationary guides in the wheels and containing a series of openings corresponding to those of the orifices of the guide passages, contained all the good points of other styles of gate and fewer defects. Where it is possible it is advisable to mount turbines on horizontal shafts, especially in electrical work. In order that the governor may act upon the gate without loss of time it is necessary that the gate should have little or no loss of motion; those gates are to be preferred which tend to close themselves, either by their own weight or through the action of the water. The speed of the periphery of the wheel should be about 65 to 70 per cent. of the velocity of the water, due to the head acting upon the wheel.

On Wednesday morning, after the consideration of some unfinished business, Mr. L. B. McFarlane was called upon to read his paper on the

HISTORY OF THE TELEPHONE IN CANADA.

Some of the earliest experiments in telephony were made at the home of Prof. Alexander Graham Bell on the outskirts of Brantford, Ontario, and there the first experimental line in Canada was erected. The first commercial telephone line was established in Hamilton in October, 1877. Early in the same year Mr. Edison forwarded two sets of his instruments to the city electrician of Montreal, and they were placed on the line between Montreal and Quebec, a distance of 200 miles, where they worked very satisfactorily. Competition was thus established at this early date, and the Edison and the Bell systems were both introduced. In 1878 the Western Union Telegraph Company secured control of the Edison patent for Canada and appointed the Montreal Telegraph Company its agent; then the Dominion Telegraph Company bought the exclusive rights of the Bell telephone, and the two rival companies canvassed the entire country, introducing their systems wherever possible. The effects of competition were so disastrous that in 1880 a new company, not connected with any telegraph company, was incorporated and called the Bell Telephone Company, which took over all the existing plants and patents. Later the validity of the Bell patent was questioned and two telephone companies were formed. The patent in dispute was brought before the Minister of Agriculture and the patent lost to the Bell Telephone Company in 1885, a similar fate befalling the Blake transmitter patent a little later. Local companies were then formed in various parts of the Dominion, although the Bell company continued to control a large portion of the business.

The next paper was that of Mr. E. B. Merrill, who considered

THE EDUCATION OF THE ELECTRICAL ENGINEER.

The necessity or advisability of a college education is first taken up, and the conclusion is that such a course of training is essential to the electrical engineer of to-day. This being settled, should the student devote the major part of his time to subjects coming under the head of mechanical engineering, or, on the other hand, give the most of his attention to electricity? Mr. Merrill thought that an even division would give the better results. Another great difficulty in the planning of a college course was the relative importance of theoretical and practical work. It was Mr. Merrill's idea, however, that practical work should be sacrificed to the theoretical when the former involves largely those operations which one can take up readily in practice. The mathematical and scientific training is absolutely necessary to the electrical engineer if he wishes to keep thoroughly up to date in all electrical matters. Another objection to practical work in college is that in colleges it is usually under artificial conditions, and not of as much value as if obtained in actual machine shops; moreover, students can generally find opportunities for such work during vacations.

DIRECT CONNECTED DYNAMOS WITH STEAM ENGINES.

In the paper then read by Mr. John Langton, the advantages of direct connected dynamos are referred to, and the credit of their design is correctly given to German engineers, if the author means to include those of German Switzerland. In regard to first cost, Mr. Langton does not think it probable that the first cost of direct connected dynamos and engines erected for operation will ever be less than or even as low as belt connected combinations. Any saving of material will be fully counterbalanced by the increased cost of testing the combined machines, whether the engine be brought to the electrical works for this purpose or whether the combined test be made where the plant is erected.

In referring to the great advantages from the marked saving of space, he says that it is surprising what can be done by direct connection in the way of concentrating power. In one plant examined, an engine room, 20 feet in length, 18 feet wide and 8 feet high contained four 75-horse-power engines, direct connected to four 50-kw. dynamos, a switchboard for the whole plant, and still left comfortable room for the attendant to move about the machines and to get at and remove any part of them.

In regard to operating expenses, on the assumption of equally good machinery, the writer sees no ground for any difference in the cost of repairs and small supplies, except an advantage on the belting account. The cost of attendance will be in favor of the direct connected plant on account of its greater compactness.

As to the relative loss from friction, the belt strain is absent in direct connection, and the weight of the rotating parts of the engine is but slightly increased by substituting the direct connected armature for the driving pulley on the engine shaft. A rough comparison of weight shows an increase of weight on engine bearings for direct connection, averaging 10 per cent. for eight sizes from 25 to 225 horse power, and 5 per cent. for five sizes from 40 to 125 horse power. We may then take the friction of the belt connected dynamo as the minimum amount saved by direct connection. Now, this is the same actual power whatever the load on the dynamo may be. It depends on the weight and the total belt strain, which are the same at all loads; as the load increases one side of the belt slackens just exactly as much as the other side tightens. Consequently, the per cent. loss in the bearings increases as the load diminishes. If the saving by direct connection is at full load, 2½ per cent. of the output of dynamo, it is at half load 5 per cent. of the output of dynamo, and at quarter load 10 per cent. of the output of dynamo. Hence the total saving during a run depends, among other things, very much upon the average load on the dynamos during the run.

The last paper of the session was that of Mr. E. Carl Breithaupt on

ELECTRIC STREET RAILWAYS.

This paper, as Mr. Breithaupt stated, was intended simply as a general review of the subject and a systematic consideration of the problems and difficulties involved. After considering the advantages of electricity as a motive power, Mr. Breithaupt divided the general subject into two distinct heads: First, where the current is generated at a central station and transmitted directly to the car motor by means of a wire line and moving contact; second, where the energy is stored in the car itself. He further classified the essentials of a generating plant under: a, generating plant; b, transmitting plant; c, the motors and car equipment.

Under the head of the generating plant is pointed out the many factors to be taken into consideration in the

selection of a site, the design of the plant, the installation of the apparatus, etc., and then gave the relative merits of steam and water power, of high and slow speed engines, of shafting and direct coupling. As to the transmitting plant, one of the most important to be considered was the distribution of the feeders, and Mr. Breithaupt clearly defined the necessary data required for this work, and suggested the best methods for practical use. The motor and car equipment were then considered at some length, the question of geared and gearless motors being discussed, and the advantages of each shown. The efficiency of electric traction was then taken up in conclusion, and the results of tests were presented to show what efficiency is likely to be reached in ordinary practice.

In connection with the paper Mr. Breithaupt exhibited some interesting curves showing the amount of power required in a car while in service on one of the lines at Toronto.

The following officers were elected for the ensuing year: President, J. J. Wright, manager Toronto Electric Light Company; first vice-president, K. J. Dunstan, local manager Bell Telephone Company, Toronto; second vice-president, John Carroll, secretary-treasurer Eugene Phillips Electrical Works, Montreal; secretary-treasurer, C. H. Mortimer, publisher "Electrical News," Toronto. Executive Committee: A. B. Smith, superintendent construction G. N. W. Telegraph Company; J. Yule, manager Guelph Light and Power Company; D. Thomson, Hamilton; T. R. Rosebrugh, School of Practical Science; Geo. Black, Toronto; H. O. Fisk, Peterboro Light and Power Company; L. B. McFarlane, Bell Telephone Company, Montreal; E. C. Breithaupt, Berlin; and T. Ahearn, Ottawa.

It was decided to hold the next meeting at Montreal next fall during the week of the local exhibition which is held there.

Thursday was spent most pleasantly in an excursion to Niagara Falls and vicinity. The members went by steamer to Queenston, thence by electric car over the Niagara Falls Park & River Railway to Chippewa, on invitation of the manager of the railway, Mr. W. A. Grant. The power houses and plant of this interesting railway were visited and inspected. By invitation of Captain Carter, superintendent of the Niagara Falls Electric Light and Power Company, a trip was taken on the steamer "Maid of the Mist." The works in the tunnel district were visited, and a view of the surrounding country was had from the lookout tower by courtesy of the Business Men's Association of Niagara Falls, N. Y.

THE ATTENDANCE.

Among those who were present were the following: J. J. Wright, president; C. H. Mortimer, secretary, Toronto; K. J. Dunstan, Toronto; C. H. C. Wright, Renfrew; L. B. McFarlane, Montreal; B. J. Thorp, Hamilton; F. Thomson, Montreal; John Galt, Toronto; M. J. Fraser, Petrolia; A. B. Smith, W. A. Towers, F. Nichols and J. H. Armstrong, Toronto; R. Black, Hamilton; E. B. Murphy, T. R. Rosebrugh, F. C. Robertson, W. A. Johnson, Hugh Neilson, and J. H. Kammerer, Toronto; John Carroll, T. W. Ness, Montreal; George Black, Toronto; John Yule, Guelph; A. C. McCallum, Peterboro; E. C. Breithaupt, Berlin; John Langton, Toronto, and H. V. Fiske, Peterboro.

Arc Lamps at the World's Fair.—III.*

THE WESTERN ELECTRIC ARC LAMPS.

In an earlier article we described with diagrams the regulating apparatus of the arc light dynamo made by the Western Electric Company, reserving at that time the description of the lamp mechanisms for this series. Accompanying this article are numerous cuts showing the methods adopted in the various types of lamps put on the market by this company.

The aim of all lamp manufacturers has, of course, been to secure a mechanism that is durable, economical, efficient and simple, and not the least interesting feature of this series of articles is the variety of methods resorted to to this end. As is well known, there are two general types of lamps in the market, viz., those intended to be used on constant potential circuits and those intended to be used on constant current circuits. The methods of control of these two classes must differ by the very nature of the conditions under which they must operate. There is still a third class of lamps which is rapidly growing in importance, viz., that adapted to alternating currents. Some of these have already been described. Those intended for direct currents, both focusing and non-focusing, manufactured by the Western Electric Company, are given herewith.

Fig. 1 represents a single carbon arc lamp. A is the main magnet; B the feed magnet; C is the clutch; D is the cut-out, and E the dash pot. The operation of the lamp is as follows: When the current is turned on, the armature A' is drawn firmly to the magnet which fixes the position of the lever B', to which the armature is attached. This causes a pull to be made upon the lever C', to which the clutch is attached, which draws the carbons apart, forming the arc. The feed magnet B is made as a shunt to the arc. Its current is in proportion to the resistance offered by the arc itself. The armature of the feeding magnet D' is in full control of the feed magnet even when the armature A' is held firmly to the magnet A. This is accomplished by means of a link connecting D' and E' together, and allowing the armature D' to freely swing around E' as a fulcrum. The

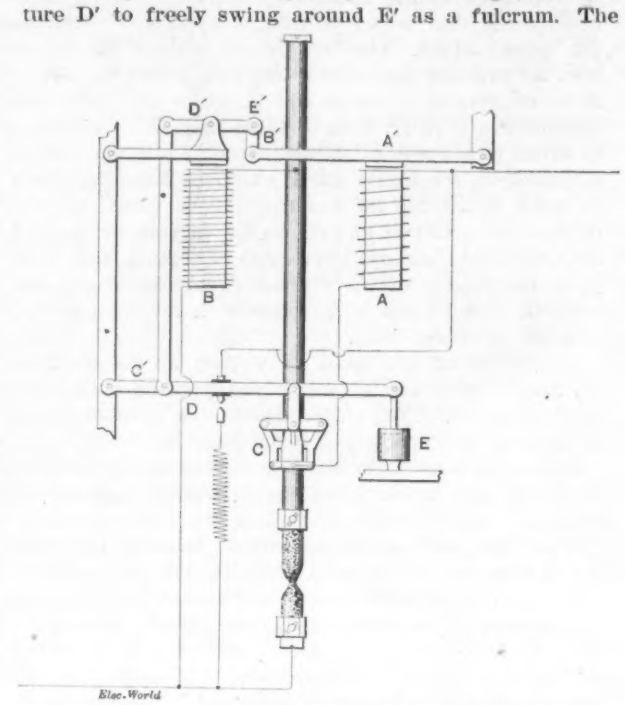


FIG. 1.—CONNECTIONS FOR SINGLE LAMP.

clutch C is of the toggle type, gripping both sides of the rod at the same time. This clutch is durably constructed, and yet is so sensitive as to release the rod at the slightest movement of the lever C'.

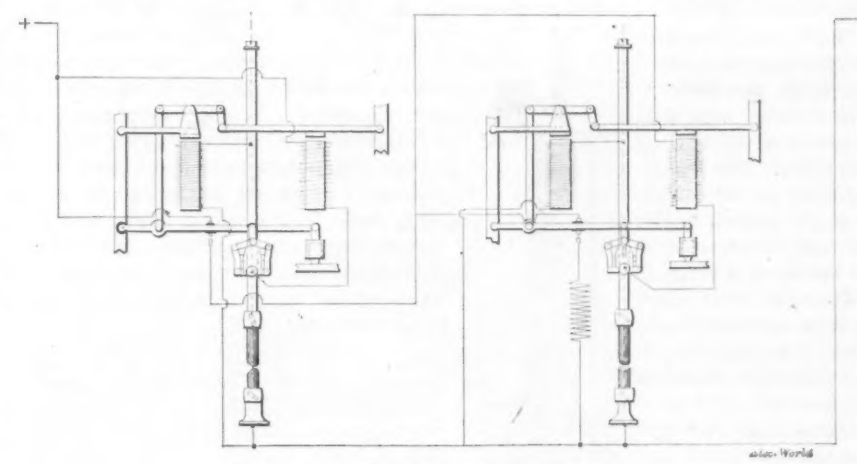


FIG. 2.—CONNECTIONS FOR DOUBLE LAMP.

Dash pot E prevents an undue vibration of the rod C'. An adjusting spring, not shown in the diagram, is attached directly to D', which controls the position of the feed armature. By means of this spring the lamp can be made to feed at any required voltage between 45 and 55 volts.

The cut-out D is provided so that when the carbons are consumed the feeding magnet draws the two contacts together and allows the current to pass directly across the lamp from one binding post to another.

This lamp is made to burn either 7 or 14 hours, as desired, the latter style requiring but one pair of carbons and is used for all-night street lighting with very satisfactory results.

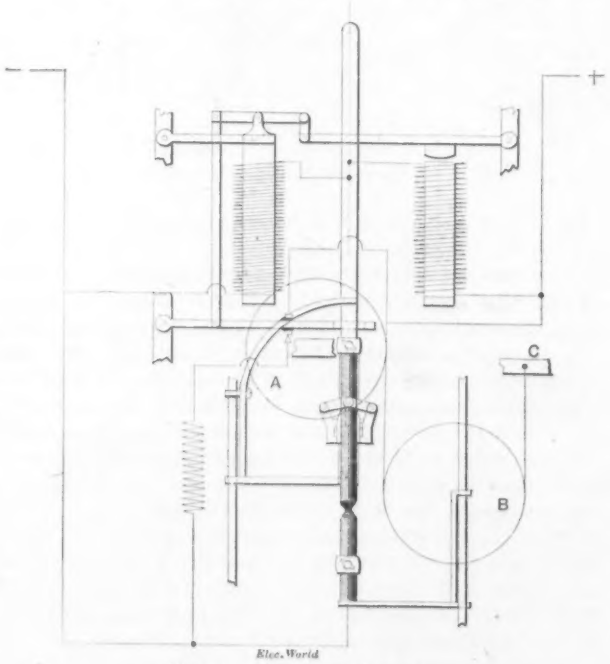


FIG. 3.—FOCUSING LAMP.

The frame in which this lamp is mounted is constructed so as to be water-proof without the use of hoods or umbrella protections. Special brass trimmings are also provided for indoor use.

The double lamp, Fig. 2, manufactured by the Western Electric Company consists of two single lamps mounted upon the same base frame, the movements of the lamps being about one-eighth inch apart. The mechanism employed for each lamp of the double lamp is exactly the same as that used for a single lamp. When the current is first turned into the lamp one set of carbons is lighted and burns until the carbons are consumed; then the feed magnet presses the switch points together and closes the circuit to lamp No. 2. The framing of these lamps is similar to that used for the single carbon. These lamps can be adapted for use on any current from 6.8 amperes to 20 amperes, and will give satisfactory results on any system.

Fig. 3 represents focusing arc lamps for head lights and reflectors. The lifting and feeding magnets and armatures are the same as those described for Fig. 1, but the attachment for keeping the arc in focus of the reflector is worthy of special mention. In this lamp the wheel A is attached directly to the rod which holds the pair of carbons and is free to move up and down, while B is stationary. Around these wheels a cord is fixed, one end of which moves up and down with the wheel A, and the other is fixed at the point C. By means of this arrangement the feeding of the upper and lower carbons is always in the proper ratio to keep the arc approximately fixed as to position. The lamp is especially adapted to such places as are subject to jarring, as in head lights for locomotives, and it is adapted to burn on various circuits, from 6.8 amperes to 20 amperes, as desired.

Fig. 4 represents an arc lamp manufactured by the Western Electric Company for use on constant potential circuits. A is the main lifting magnet; B is the feeding magnet; C is the rack, and D is the verge. The action of the lamp is as follows: When the current is turned into the lamp the magnet A draws its armature to its poles, thereby causing a pull to be made upon the lever E, which draws the arc. The current in the magnet B is controlled by the arc of the lamp which holds or releases the verge D by means of the lever F, and the lamp is allowed to feed through the train of gearing and the rack C placed directly upon the carbon rod. The point claimed for this method of controlling the feed mechanism is the positiveness with which any variation in the current is detected and overcome. The lamp is composed of but few parts, all of which are easily accessible. The adjustment is made by means of an attachment, not shown in the drawing, which allows of ready and easy adjustment of the lamp at all times.

Fig. 5 is a diagram showing a focusing arc lamp for use on incandescent circuits, which can be burned at any angle from horizontal to vertical. It is especially adapted to stage use and is made with reflector, lens box and olivet hood. In this lamp a solenoid is used in the place of a magnet. The passage of the current through the solenoid lifts the armature and draws the arc. As the resistance of the arc changes the current in the solenoid changes and thereby holds or releases the verge which directly controls the feed mechanism.

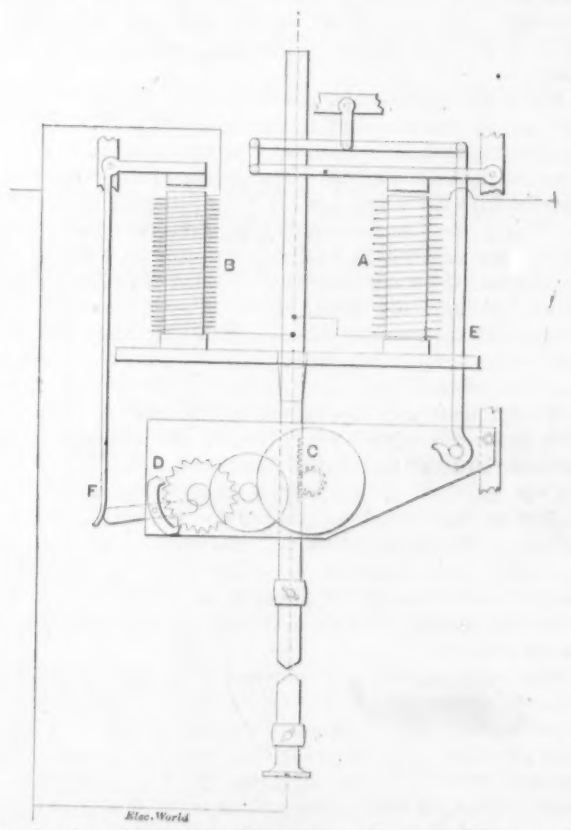


FIG. 4.—ARC LAMP FOR CONTINUOUS CURRENT INCANDESCENT CIRCUITS.

The feed mechanism does not depend upon gravity,

* For previous sections of this article see THE ELECTRICAL WORLD of Aug. 26 and Sept. 16.

but acts by means of a spiral spring, A, which is strong enough to adjust the lamp while resting in a horizontal position. The train of gears is adjusted so as to keep the arc uniformly fixed at all times. The lamp is simple and durable in its construction, containing but few parts, which are easily accessible. They are mounted upon a stand which can be turned 360 degrees. The base of the stand is made to inclose a rheostat,

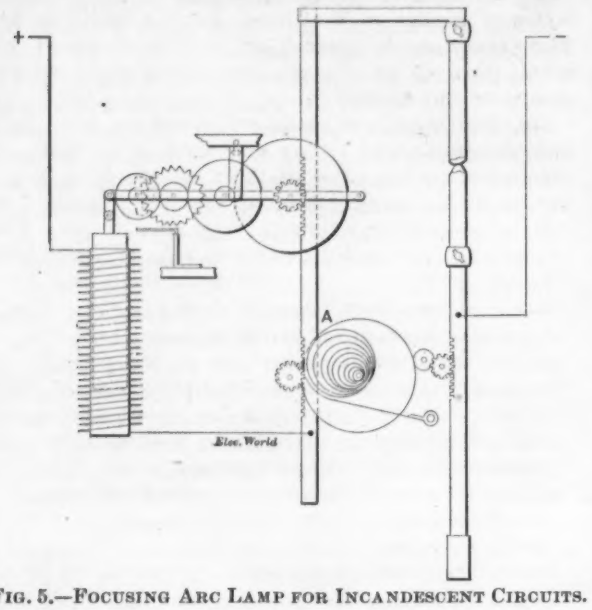


FIG. 5.—FOCUSING ARC LAMP FOR INCANDESCENT CIRCUITS.

which is coupled directly with the lamp, allowing it to be burned upon a 110-volt current. The lamp requires about 20 amperes and is normally 4,000 c. p.

All parts of the Western Electric lamps are carefully made on jigs so as to be interchangeable.

THE EXCELSIOR ARC LAMP.

The Excelsior company, of New York, manufactures a variety of styles to suit different requirements. The lamp for interior use where the ceilings are high is that known as the single or double carbon rack feed lamp. The works of these are incased in a tight-fitting box which is both dust and moisture proof. The regulation of the single carbon lamp is effected in the following manner: The movement of the upper carbon holder is controlled by a train of wheels carried on a lever which swings on a fulcrum. The escapement is arrested when the lever is swung so as to lift the carbons apart and set free when they are caused to approach each other. The end of the lever caries a U-shaped iron core whose legs take into fine wire solenoids fastened to the floor of the lamp case, and has attached to it a rectangular spring capable of adjustment. The iron core of a coarse wire solenoid rests on the same lever, and by its weight acts in opposition to the pull of the spring. This latter solenoid is in series with the lamp and raises its core the moment current is sent through the lamp, thereby allowing the spring to lift the carbons apart by means of the lever and gear train. This may be called the arc-striking device. The fine wire helix, or solenoid, is connected at its two ends to the positive and negative terminals of the lamp and is in shunt to the arc.

When the carbons burn with a short arc most of the current, of course, takes this path and but little follows the shunt, and the action of the spring is to separate the carbons still further. This results in throwing more current into the shunt until it draws its core sufficiently to release the escapement detent, and the wheel train allows the carbons to feed sufficiently. As soon as the proper length of arc has been re-established, the shunt helix, through the diminished current traversing it, allows its core to be lifted a little by the retractile spring and the escapement engages its detent again; the core of the series coil remains firmly drawn up by the suction of the coil aided by the attraction of an iron armature upon the coil until the current is cut off and the light thereby extinguished.

If a number of lamps are burning in series, the failure of one to feed its carbons down would, of course, result in the extinction of all. To prevent such an occurrence each lamp is provided with an automatic cut-out which furnishes another path for the current when the distance between the carbons becomes abnormally great.

The automatic cut-out consists of a light iron plate hung in pivots near the shunt coil and which is forced toward it by the combined attraction of the coil itself and its core when an undue amount of current flows through the shunt. In swinging over it completes a shunt circuit of low resistance through which the current flows when the light goes out. A small magnet whose coil forms part of this circuit keeps the light iron plate attracted and maintains the cut-out until the arc is re-established.

The operation of the double carbon lamp is similar to that of the simple lamp, with the exception that it has an automatic trip which lights the second set of carbons when the first set has been consumed.

The duplex lamp for street service is shown in the accompanying cut, Fig. 1. A glimpse of this might, at first sight, give the impression that no spool magnets were employed, but a closer inspection reveals the fact that they are all inclosed in iron shells which have a double function, viz., to protect the spools and at the same time to act the part of bell magnets.

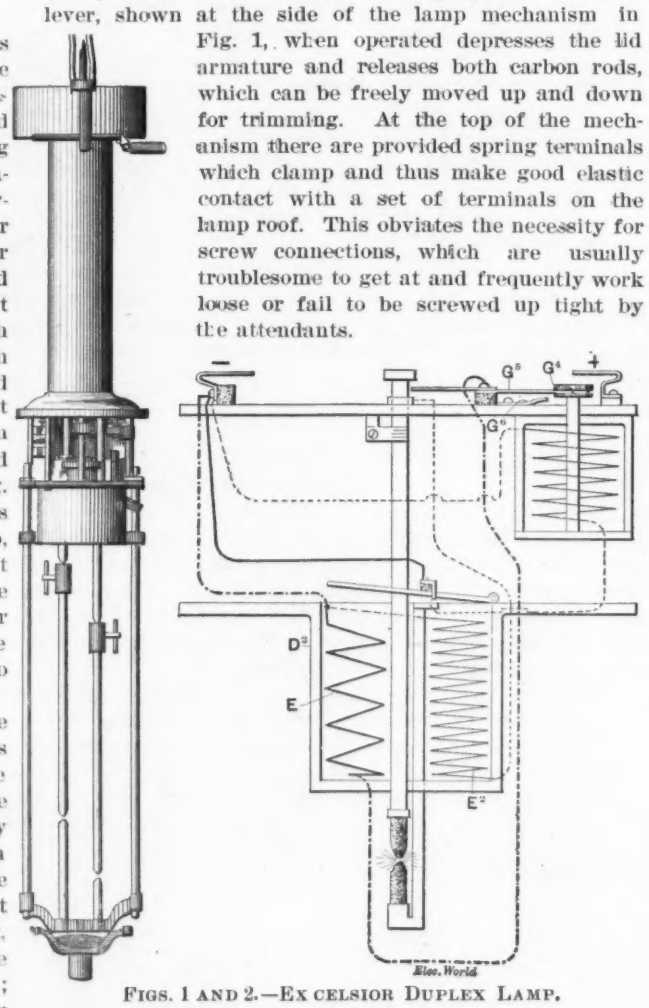
The operation of the lamp will be best understood by reference to the diagram, Fig. 2. The lamp is so constructed that before current is applied the carbons are drawn apart. The bell-shaped magnet placed below the exposed mechanism has two windings; one of these consists of a coarse coil E, while the other consists of fine wire E^2, both of these magnet spools being in shunt to the arc, as shown. Thus, when the current is turned on, the coarse coil E exercises sufficient power to draw down the lid armature L, to which the rod clutches are attached, and allows the carbons to descend. As soon as the carbons have come in contact they complete the circuit of the magnet spool inclosed in the shell G, which spool is in series with the carbons and consists of coarse wire.

The action of this spool is to draw up its armature G^3, at the other end of which is supported an insulating button G^4. This button raises the spring contact G^5 from G^6 and opens the coarse shunt E.

The arc is now under the sole control of the fine wire shunt E^2 and a retractile spring, which opposes its action.

While the first set of carbons is burning the other set is held up rigidly by a lever on the lid armature. The top of the first carbon rod is provided with a button which is so arranged that when the carbons are burned out the button trips the lever holding the second set of carbons, which are thus brought immediately into action. The action, here described, is exceedingly simple and the operation of the lamp in service is very smooth.

Special attention has been devoted to the details which facilitate the cleaning of the lamp and also insure the safety of the trimmer. For this purpose the small lever, shown at the side of the lamp mechanism in Fig. 1, when operated depresses the lid armature and releases both carbon rods, which can be freely moved up and down for trimming. At the top of the mechanism there are provided spring terminals which clamp and thus make good elastic contact with a set of terminals on the lamp roof. This obviates the necessity for screw connections, which are usually troublesome to get at and frequently work loose or fail to be screwed up tight by the attendants.



FIGS. 1 AND 2.—EXCELSIOR DUPLEX LAMP.

The lamp hanger, it will be noted, consists of an inverted cast iron hood, containing a slate base, which carries all the terminals and a cut-off switch. Unlike the usual cut-out switch, which merely shunts the lamp without putting it out of the circuit, the switch cuts the lamp off entirely from the circuit so that the attendant is perfectly safe even in the dampest weather. Here also the arrangement is such that the mere insertion of the lamp into the hanger effects the contact automatically so that no screws are required. The arrangement is evidently waterproof, and besides requiring no hanger board obviates the necessity of a hood. Besides the mechanical protection afforded by the magnet spools by surrounding them entirely by iron, it is believed that the fine wire spool will also be largely protected from lightning, and the results already obtained by the lamp in practice appear to bear this out.

In the lamp used in places having low ceilings the arc is only 15 inches below the top of the lamp. This lamp moves the upper and lower carbons at the same time, keeping the arc in the centre of the globe. The lamp used for photographic purposes, when lenses must be employed, is that known as the standing focusing lamp, and is of great simplicity.

For headlights on steamboats and locomotives a focusing lamp is constructed of such proportions that it can be inserted into a headlight reflector case, taking the place of the oil lamp commonly carried by them. It fits the case and reflector without any alterations being required.

Lamp Tests at the World's Fair.

Prof B. F. Thomas, chairman of sub-committee 4 of the Committee on Awards, recently gave out a statement concerning the testing of the incandescent lamps at the World's Fair which embodied a list of the lamps submitted, a copy of the agreement of the scheme of the tests signed by the representatives of the companies submitting lamps, and sundry information. The statement has been withheld so long because of the delay in reaching an agreement with the exhibitors and obtaining their signatures.

An illustrated description of the lamp testing laboratory and a general account of the proposed plan of the lamp tests has already been given in The Electrical World, Sept. 9, 1893, but the following additional information is interesting:

The lamps entered in the test are:

Edison lamp, 50 v. and 110 v., and Thomson-Houston lamp, 50 and 110 v., entered by the General Electric Company.

Novak lamp, 50 v. and 110 v., by the Waring Electric Company.

Packard lamp, 50 v. and 110 v., by New York & Ohio Company.

Stopper lamp, 50 v., by the Westinghouse Electric and Manufacturing Company.

The number of lamps of each make is limited to 40 of each voltage, or 80 of each make, except the "stopper" lamp of the Westinghouse company, which enters simply as a 50-volt lamp.

The tests will be commenced Friday, Oct. 8, and will be continued 24 hours each day, except Sunday, until Oct. 31, and possibly later.

Photometric readings of lamps will be taken for the first time after they have been on the rack 10 hours, then at the following intervals: 20, 20, 50, 50 and 100 hours. The idea of testing often in the early life of the lamp is that any change that may take place will occur then, if at all.

The following is the copy of the agreement between the committee of the judges and the exhibitors exhibiting lamps to be tested, which may prove of interest:

Lamps entered for award shall be subjected to a test, whose object shall be to determine the mean horizontal candle power, the efficiency and life, and the blackening of the lamps entered at proper intervals during the time covered by the test.

Current Supply.—The Fort Wayne Electric Company has placed an engine and all dynamo machinery necessary at the disposal of the committee.

This machinery will have nothing to do except to supply current to the lamps under test. One-hundred-and-ten-volt lamps will be supplied with direct current and 50-volt lamps with alternating. Lamps will be placed on racks, on circuits of heavy copper rod, all lamps of given voltage being on one circuit. Careful provision will be made to maintain voltage constant.

Standards.—The English sperm candle for candle power. Electrical standards as agreed upon by the sub-committee on instruments.

Instruments.—For candle power measurements, a Lummer-Brodhun photometer; length of bar, 250 centimetres. Methven screens, using carbureted gas—gas to be filled with gasoline distilled between 35 degrees and 50 degrees C., and from 90-degree gasoline.

The electrical instruments used will be Weston instruments, which will be tested at the beginning of the test and at intervals during its progress by sub-committee (1) (on instruments, etc.). Recording voltmeters (if such can be obtained) will be placed on the life test circuits.

Scheme of Test.—The photometer being properly mounted the Methven screen will be tested by comparison with standard candles. This test being satisfactorily completed, two or more 32-c. p. lamps of proper voltage and carefully selected with reference to uniformity of radiation in a given direction will be tested at standard voltage. One of these lamps, so measured, and thereafter designated as working standards, will be placed on the photometer. Each lamp entered for test will then be compared with the working standard, both being carefully adjusted to standard potential. The mean horizontal intensity of each lamp will be obtained preferably by spinning when under comparison with the working standards, which latter will be maintained at about 16 c. p. The candle power of each lamp in a marked position (azimuth) will also be determined at the same time, and its "position factor" derived. At the same time that the photometric work is done on each lamp careful readings of potential and current, or of potential and watts, will be taken. It should have been stated earlier that a storage battery of proper size will be used to furnish current to all lamps when under photometric tests, and rheostats and switches in connection with the battery, so that the lamps may be run at the exact voltage intended.

After the initial measurements are made, the lamps, each tagged or otherwise marked with an individual number, will be placed on the rack. The rack or rack section being filled, switches will be closed, time noted, potential carefully adjusted and maintained constant.

At intervals (as small as convenient in the earlier days of the life test) each lamp will be removed from the test rack, placed on the photometer in its "marked position," and readings of candle power, voltage and current (or watts) taken.

Complete records of all things affecting the tests or results will be kept in proper blank books.

Results.—The data of the test will be completed and tabulated, and curves will be drawn, so as to show the following points:

(1) Mean horizontal candle power and percentage of initial candle power at each reading throughout the test.

(2) Efficiency (watts per candle power) at each reading.

(3) Time of breaking of each lamp broken.

(4) Average cost of a candle power hour of light produced by each make of lamp at intervals during its life, such cost to include cost of lamp and cost of energy required to operate it. Separate curves will be prepared for the average of each make, giving the above cost under varying conditions, varying from 15 cents to 50 cents for cost of lamp, and from 10 cents to 25 cents for cost of 1,000 watt-hours of energy.

Report.—A report upon the test giving a full account of all points concerning the methods and instruments used, details of machinery and circuits, all original readings, etc., will be formally made to the proper official of the Exposition, with the recommendation that it be printed at the earliest possible date. If prompt printing is not found possible, permission to give the report to the electrical press will be asked.

The test will continue until Oct. 1, running 24 hours per day; if at that time it seems desirable to continue the run, the committee will endeavor to secure such continuance.

With the exception of "spinning" the above scheme is acceptable.

(Signed) John W. Howell, for Edison General Electric Company and Thomson-Houston Electric Company; F. A. Baux, Agent, the Waring Electric Company; E. E. Keller, Manager and General Superintendent Westinghouse Electric and Manufacturing Company; T. S. Gassaway, for New York & Ohio Company.

Mr. Martin's Lawsuit—Its Object Cash, Not Vindication—Fruitless Exertion—Why and How It Failed.

Many readers of this journal are aware that for the last three years The Electrical World has been engaged in a legal controversy with a former employe, Mr. T. C. Martin.

This controversy was not of the paper's seeking, and it was only after every effort had been made on its part to avoid becoming involved in it, and only when it was compelled to step forward to defend its rights, that it joined in the litigation.

It is probably safe to assume that had Mr. Martin imagined for one moment that he would have met with the resistance he did, the litigation would never have been begun.

It may have been supposed at the outset of this contest that it would be cheaper for the World to pay than to fight; and such a supposition may have been correct. The World, however, in the course it chose to pursue was not controlled by any such motive, and as a result of its adherence to a principle rather than to pursue a policy the W. J. Johnston Company and Mr. Johnston during the time referred to have not only been made to bear the burden of resisting lawsuits which never had, and never could have had, any foundation in morals, and the result of which up to the present time proves that they had no foundation in law; but they have been made the subject of slander, both by word of mouth and also by statements published in a journal whose existence is due largely if not entirely to the training which the men who conduct it received and acquired while in the pay of The Electrical World.

Under all this the paper and Mr. Johnston have kept silent, and refused to notice, much less to refute, these statements. They have done so because they have always believed that the time would come, and that quickly, when the motives which actuated this conduct would be exposed and the mendacity of the statements referred to made plain.

As one instance of these slanders, such of our readers as may occasionally look into the columns of the "Electrical Engineer" may recall a paragraph which was published in that paper on the 22d of June, 1892. That paragraph purported to be an announcement of a decision which had been rendered by the Court of Appeals on the application made by Mr. Martin for a mandamus against the W. J. Johnston Company, and of alleged reasons which caused him to obtain the mandamus. In that paragraph these words occurred:

"Mr. Martin, who was, and is, a stockholder in the W. J. Johnston Company, believing that its affairs were being improperly managed by its president, who for more than two years has paid no profits except to himself, obtained from Judge Lawrence, of the Supreme Court, through Masten & Nichols, his attorneys, a peremptory writ of mandamus, requiring the company to exhibit its books to him, and to allow him to make extracts or memoranda therefrom."

This paragraph contains the slander by implication—which is always the resource of the coward—that Mr. Johnston was improperly managing the affairs of the company.

It also clearly implied, and was intended to imply and to create and convey the impression that Mr. Johnston had withheld profits from some person or persons entitled thereto.

We shall leave the reader to say if to make such insinuations is honorable, or if such methods are the methods of honorable men.

A stranger to the facts, reading these charges, although they are expressed only as the "belief" of Mr. Martin, would naturally be impressed with them, because he would doubtless give Mr. Martin credit for not expressing even his belief on a matter so serious unless that belief was founded on evidence more or less substantial. Yet we know and can satisfy any reasonable mind that not even the most malicious imagination, if in possession of the facts of which Mr. Martin was then in possession, could persuade itself to believe that there was any ground for these insinuations.

Immediately after the publication of this paragraph Mr. Johnston called the attention of the president of the "Engineer" to the erroneous and injurious impression it might create; and requested him, as a matter of justice, to correct it and prevent that impression. He took legal advice on the subject, and, through his counsel, declined to have the matter corrected.

This course being, apparently, in accord with the sense of justice which guides the minds of those who manage the "Engineer" and satisfactory to them as a fulfillment of their duty in this matter, Mr. Johnston concluded for the time being to let the matter pass. He was not conscious of having done any wrong, or of having omitted to perform any duty which he owed to the men who started the publication of these innuendos; and if they, as a relief to their chagrin and disappointment, had to resort to making such statements, he felt that he could afford to await exposing their motive and purpose until he could do so by some facts sworn to by Mr. Martin himself and the witnesses he called to his aid in this contest.

In making this exposure, as we propose to do now, it is proper, though perhaps somewhat out of place in the order of events, to refer here to the mandamus proceeding of Mr. Martin which furnished the pretext for publishing the paragraph complained of.

During the month of June, 1890, Mr. Joseph Wetzler commenced proceedings in the Supreme Court against the W. J. Johnston Company, Limited, to compel it by mandamus to allow him to examine its books and records, he claiming to be a stockholder in the company. His claim was substantially the same as the claim Mr. Martin afterward made in his application for a mandamus.

When the application in behalf of Mr. Wetzler was made Mr. Johnston was in New York, and he opposed the granting of the mandamus, on the ground that while Mr. Wetzler was nominally the holder of 20 shares of the stock of the corporation, yet under the terms of the written agreement between him and Mr. Johnston he had at that time no right to continue to hold the stock. For this reason it was claimed that he was not entitled to the privileges the law under which the corporation was organized gave to stockholders to examine the books of the company, and was not, therefore, entitled to a peremptory writ of mandamus such as he asked for.

As we progress it will become plainer in what manner and for what reasons Mr. Wetzler's right to continue to hold the stock had ceased before the time at which he made this application. It is enough to say here that Mr. Wetzler's application was formally argued before the Supreme Court and was denied; and he never secured by this method the examination of the books and records he sought.

In denying the application the Court announced that it would give Mr. Wetzler what lawyers call an "alternative mandamus." That, as we understand it, is nothing more than a writ which commands the person opposing the granting of the mandamus to show cause, why the act which the person seeking it wishes to have done, should not be done; in other words, to try the question in dispute between them, to the end that it may be determined whether or not the person who applies for the mandamus is truthful in what he claims and is entitled to what he asks.

When this course is taken the question at issue has to be tried. Such a trial would have compelled Mr. Wetzler to appear before the court and produce evidence to establish his claim that he was a stockholder in the W. J. Johnston Company, and had then a right to hold the stock. Mr. Wetzler and his witnesses would on such a trial have had to submit to cross-examination, and he could not escape meeting the question, which all through the whole of these proceedings seems to have been the one point both he and Mr. Martin have sought to avoid, that is, the question whether or not, on the 5th of March, 1890, they were rightfully discharged from their employment on The Electrical World, and whether by such discharge their contract was terminated and their right to hold stock in the W. J. Johnston Company ceased.

Mr. Wetzler did not accept the alternative mandamus.

From this it is fair to assume that, however much he may have desired an examination of the books of the company, he was not willing to take it, or rather to take his chances in securing it, and submit to have the question of his actions toward the Johnston company investigated in the manner they would have been inquired into.

Mr. Wetzler's efforts to secure the mandamus ended here, and no more was heard from him on that subject.

This slight check to Mr. Wetzler one would naturally think would have been sufficient to discourage Mr. Martin from pursuing the same course. That is, one would suppose that he would have been satisfied he could not succeed where Mr. Wetzler had failed—at least not unless he introduced into his application some circumstances which would make it unlike that of Mr. Wetzler. How he could have seen his way clear to do that was something which at that time nobody probably except Mr. Martin himself could have foreseen.

He held his stock precisely as Mr. Wetzler held his; and he had been discharged from his employment on The Electrical World at the same time and for substantially the same cause as Mr. Wetzler. However, he did accomplish his purpose, and he brought about the result which he desired in a manner somewhat singular, by the aid of a circumstance—fortunate for him—which did not exist when Mr. Wetzler made his attempt. Mr. Martin's resources, which in all these proceedings have been exceedingly fertile, were in respect to this mandamus not entirely exhausted by Mr. Wetzler's effort. As in the case of a certain letter of June 7, regarding which we shall have a good deal to say further on, at this time something turned up which proved helpful to Mr. Martin; and this was the way it happened:

About the end of August, 1890, Mr. Johnston left New York on a trip to Europe, and he had not much more than passed Sandy Hook when Mr. Martin apparently commenced preliminary operations to secure his "peremptory writ of mandamus." When Mr. Johnston left he had no reason to suppose that any such application as Mr. Martin afterward made would be made, or if such a thought did occur to him he would naturally assume that the same course would be adopted by the officers remaining in charge of the affairs of the company as was adopted in Mr. Wetzler's case when he was present and managing its affairs. However, Mr. Martin, with that wonderful foresight which he showed when waiting so patiently for the letter of June 7, to which we have slightly referred, and to which we promise the reader we shall refer again, may have known or may have had reason to believe that such would not be be the case, and on the strength of this knowledge or belief he apparently went ahead with his application, feeling that he would not encounter the obstacle which lay across Mr. Wetzler's path.

Mr. Martin made his application for the "peremptory writ of mandamus," and for some reason which we never could understand, and which has never been explained, the officers of the W. J. Johnston Company then in charge—Mr. Johnston being in Europe or on his way there, as we said—omitted to make the necessary affidavit setting forth the facts showing how and why Mr. Martin at that time continued to hold stock in the company.

The attorneys for the company being thus unable to dispute by the oath of any officer familiar with the company's affairs the statements made by Mr. Martin were compelled to rely upon an affidavit made by a stockholder setting forth the facts so far as he knew and understood them, and the further fact that his counsel advised him that Mr. Martin was not the owner of the stock. This the Court held was not sufficient in law as an answer to Mr. Martin's positive assertion under oath that he was the owner of the stock, and for that reason, and that reason only, in the absence of Mr. Johnston, and because no one attempted to contest the facts, the "peremptory writ of mandamus" asked for by Mr. Martin was granted. Thus Mr. Martin did not encounter the obstacle which lay across Mr. Wetzler's path.

These are the facts as to how Mr. Martin succeeded in obtaining the mandamus which he has boasted about so frequently; and while it must be admitted that he was successful, it may remain a question whether his methods did him as much credit as he has always appeared to think he was entitled to. One thing he deserves to be commended for, and that is his sagacity. By opportunely choosing his time when Mr. Johnston was out of the country, he avoided meeting Mr. Johnston upon the plain question whether or not he had at that time a right to continue to hold the stock. In this one respect Mr. Martin's judgment was excellent. That it was is made apparent not only by the result of Mr. Wetzler's effort, but also of his own lawsuit.

The mandamus was Mr. Martin's one and only success.

In his application for this mandamus Mr. Martin, however, made no such charges in the papers upon which it was presented to the Court as are contained in the paragraph which he published in the "Engineer." On the contrary, he gave as a reason for making his application the following statement only, which he swore to in those papers:

"Deponent (Mr. Martin) desires to inform himself as to the names of the present stockholders, and the respective amount of stock held by them, and as to the profits of the company from its business during the year 1890, *and desires to obtain* such knowledge generally of the concerns of the company as will *enable him to be advised as to the present value of his stock.*"

This is what he swore to. What he published in the "Engineer" was:

"Mr. Martin * * believing that its" the W. J. Johnston's Companys] "affairs were being improperly managed by its president * * * obtained from Judge Lawrence, of the Supreme Court, * * * a peremptory writ of mandamus, etc."

The difference between these two statements is very striking. When he went before the Supreme Court he stated to the Court in his affidavit that what he desired was such information generally as would enable him to be advised of the present value of his stock. When he wrote in the "Engineer," ostensibly for the enlightenment of his readers about what he had been doing at court, he said that he went there believing there had been improper management in the affairs of the company by its president, clearly implying that what induced him to apply to the Court was his belief in alleged improper management. These statements about improper management and also about profits having been withheld have absolutely no foundation in anything contained in the affidavits upon which this mandamus was granted; and the journal which published the paragraph containing such statements could not have found any justification in the record of that litigation for making them; it is clear, therefore, they must have originated in a source outside of that record. They were mere baseless slanders. What, then, could have been the object of Mr. Martin in publishing, or permitting to be published, these falsehoods in the paper which is supposed to be under his control? It is plain that he was actuated by malice toward Mr. Johnston; and the insinuations were made through the columns of his paper, where he hoped it could not be met and refuted, while he did not dare to make similar assertions in his legal proceedings, where he must make them under oath, and where the matter could be properly answered.

But not only did these assertions find no support in the proceedings for the mandamus, but Mr. Martin knew, of

his own personal knowledge, at the very time this paragraph was published, as we shall show hereafter by his own and his witnesses' statements, made under oath, that there was no improper management of any kind in the affairs of the company, and that no profits had been withheld by anybody connected with this paper from any one who was in law or in morals entitled to them; because Mr. Martin and his aids, both before and immediately after the mandamus was granted—in March and November, 1890—and months before the paragraph was published, had made an examination of the affairs of the company, and had made "extracts or memoranda," as his paragraph says, from its books; and we feel assured that he found nothing to justify his insinuations, and very little that yielded him any consolation, except, perhaps, a sly glance at The Electrical World's subscription lists or its advertisers' accounts, which may have afforded him some aid in his then new enterprise.

One thing the reader may set down as certain, that he did not find any evidence that the company's affairs were being improperly managed, or any evidence that profits were being withheld from any one entitled thereto.

Had he found any such evidence, no regard either for the company or for Mr. Johnston would have restrained him from publishing it. He would probably have done so with the utmost alacrity, as it may be assumed that it would have been more agreeable, even to him, to him done so after having found evidence showing such charges to be true, than to resort to making insinuations conveying the same charges, which he knew were not true.

But why did Mr. Martin stop where he did?

When he gave the information sought to be conveyed by these insinuations the advantages of the circulation of his journal, why did he not go one step further?

Why not tell us from whom profits were withheld?

Did he have in mind himself, and himself only, as that solitary stockholders who had been deprived of his rights, or perhaps one other who was close to him?

Did he feel lonely, as he contemplated what a mistake he had made—of what his folly had been the means of depriving him?

If he had himself in mind as that single and solitary stockholder who had been shorn of his rights, as we believe he had, and in whose cause he was then bringing to bear all the influence of his journal, such as it was, why did he not state, for the purpose, as it were, of emphasizing the helplessness of his condition, the state and quality of his title to the stock from which he wanted it to appear that he was a stockholder?

Did he omit to state this because his regard for the truth would have restrained him from also omitting to mention that Mr. Johnston had, long before the paragraph was published, not only refused to pay him any profits, but had brought an action against him to compel him to give up all the stock which he held in the company, and which he was bound by the terms of his contract to give up whenever his employment on the paper came to an end. Had Mr. Martin told us all the facts as to his title to this stock it might not have been pleasant for him to admit what is also a fact, that when this action was commenced against him it was agreed between him and Mr. Johnston that the sole question which was to be determined in that action was the amount which he was to be paid for the few shares of the stock, which was all that he ever held. The fact that Mr. Johnston was entitled, as a matter of right, to that stock was not to enter into it at all, because it was conceded that this right existed in Mr. Johnston's favor without any question.

Sometimes it may not be pleasant to tell the whole truth, and most likely this restrained Mr. Martin from referring to his title to the stock, when he could not with credit to himself or with entire consistence with many of his previous statements, some verbal and some in writing under oath, disclose all the facts connected with that title.

We have said enough about the "Engineer's" paragraph; certainly enough to expose the malice which prompted it and to convince any one that there was no foundation for the slanderous insinuations it contained. Mr. Martin's conduct in publishing it, and the course his paper afterward pursued in refusing even to disclaim any intention to detract from reputations, are pronouncedly characteristic of the methods by which he has carried on his legal warfare against The Electrical World.

We do not think that anything but good can come from even further exposing these methods, and now that Mr. Martin has been induced by the discouraging result of his lawsuit to declare a truce in his contest, an exposition of these methods, in other words a report of his case—for as an exposition that is all that is needed—and a mild criticism thereon may aid him to much sober reflection on all the energy he has expended for the last three years or so, and especially on the results he has attained thereby, and may also explain to our readers many things which they may wish to have made plain.

We believe that the time has now arrived when this journal ought, not only for the information of its readers and all who are interested in its welfare, but also in justice to itself and Mr. Johnston, tell why and how Mr. Martin became a stockholder in the W. J. Johnston Company, and also show the entire foundation, as he displayed the same in court, which there was for the course which he and other employees have pursued toward the paper since their connections with it were severed. We will do this all the more willingly because we feel that now we need not depend upon any statements of facts made entirely by ourselves, but we can use for the purpose of establishing the correctness of our position all through this controversy the statements made by themselves under oath in the court to which some of them appealed, with more courage than judgment, to redress their alleged grievances.

These statements will show what Mr. Martin's and Mr. Wetzler's connection was with the World, and how that connection came to an end.

At the beginning of the year 1889 the publishing of The Electrical World and such other business as was connected therewith, which up to that time had been owned by Mr. Johnston, was organized into the corporation known as the W. J. Johnston Company, Limited. This was done for the purpose of enabling Mr. Johnston to give Messrs. Martin and Wetzler, with two other employees, an interest—in the nature of a proprietory interest—in the paper. Mr. Martin has testified to this himself. With this object in view, Mr. Johnston entered into written agreements with each of these four men, none of whom had been in his employ for less than five years. We shall quote Mr. Martin's agreement. Those of the others are in all respects substantially alike.

Memorandum of agreement between Mr. W. J. Johnston, of the City of New York, and Mr. Thomas Commerford Martin, of the same place.

Mr. Martin hereby agrees to undertake the editorship of The Electrical World, and to devote his entire time and attention to the editorship of the said paper and to the interests of the W. J. Johnston Company, Limited, at the yearly salary of two thousand five hundred dollars ($2,500).

He agrees to honestly, diligently and faithfully perform his duties as editor of The Electrical World, and any other duties undertaken by him on behalf of the said company, to the best of his ability; and he also agrees not to do any act or thing whatsoever whereby the business of the W. J. Johnston Company, Limited, shall suffer any damage or loss directly or indirectly while in the said employ, and also agrees not to lend or give his name for use to any electrical corporation or company, as director, officer, trustee or otherwise, and also agrees not to purchase or hold any stock or certificates of stock in any electrical corporation, company or partnership, or become interested therein, without first obtaining the written consent of the party of the first part, and also agrees while in said employment not to devote any of his time or attention during business hours or otherwise in the interests or to the advantage of any other corporation, company, person, firm, electrical or otherwise, without the consent of the party of the first part, or of a majority of the directors of the W. J. Johnston Company, Limited.

The provisions and covenants in the first part of the preceding paragraph are made solely for the purpose of protecting the independence, reputation and standing of The Electrical World, as the connection in any way of an officer or employee of the W. J. Johnston Company, Limited, with any other electrical corporation, company or partnership must seriously injure said Electrical World and the business of the W. J. Johnston Company, Limited.

In consideration of the above agreement on the part of Mr. Martin, Mr. Johnston agrees to transfer to him one hundred shares of the capital stock of the W. J. Johnston Company, Limited, of the par value of ten dollars ($10) each, and he covenants that if during the years 1889, 1890 and 1891 the dividends upon the said stock do not reach the sum of two thousand five hundred dollars ($2,500) per annum, he, the said Johnston, will make up to said Martin the deficiency upon the stock owned by him. Such guarantee, however, shall cease at the end of the year 1891.

It is mutually agreed between the parties that the aforesaid one hundred shares of the stock of the W. J. Johnston Company, Limited, to be issued in the name of Mr. T. C. Martin, will be by him transferred to Mr. Johnston in trust, and will be held by Mr. Johnston for the following purposes and to be used in the following manner:

At the end of each and every year of the continuance of this contract Mr. Johnston shall surrender 20 of said shares to Mr. Martin.

If Mr. Martin or Mr. Johnston should abandon or terminate this contract the shares undelivered shall remain the property of Mr. Johnston, and Mr. Johnston, his personal representatives or assigns, or the W. J. Johnston Company, Limited, will have the privilege of purchasing from Mr. Martin the stock already delivered to him at a price to be agreed upon between them; and in case they should not agree upon the price, then at the price fixed by arbitrators, one of whom shall be named by each of the parties hereto and a third named by the parties so chosen.

In case of the death of Mr. Martin within one year from the date of this contract, all the said stock except 20 shares shall become the property of W. J. Johnston.

In case of the death of Mr. Martin after the expiration of one year from the date of this contract, all of the said one hundred shares shall be the property of his estate. Mr. Johnston, however, his personal representatives or assigns, or the W. J. Johnston Company, Limited, will have the privilege of purchasing the said stock from Mr. Martin's personal representatives, the price thereof to be determined in the same manner as provided in the preceding paragraph.

It is further agreed between the parties that in case of the death of Mr. Johnston, Mr. Martin shall be entitled to all the dividends earned by twenty-five shares of the stock of the W. J. Johnston Company, Limited, in addition to the compensation hereinbefore agreed upon. This stock will be placed in Mr. Martin's name and held in trust by the estate of W. J. Johnston, five shares being delivered to Mr. Martin each year, but Mr. Martin shall draw the full dividend upon the entire twenty-five shares. The amount of the dividend as to such twenty-five shares is not guaranteed.

This contract shall go into effect on the 1st day of January, 1889, and may be terminated by either party, at the end of any year, upon thirty days' notice in writing.

In witness whereof the parties have hereunto set their hands and seals this 26th day of December, 1888.

In presence of

Geo. Brush — William J. Johnston (L.S.)

Thomas Commerford Martin (L.S.)

As will be noticed, by the terms of this agreement either Mr. Johnston or Mr. Martin had the privilege at the close of any year of bringing it to an end by giving to the other the notice therein provided; and, further, that if Mr. Martin remained in the employment of The Electrical World, under that agreement for five years, he would become entitled absolutely, for each of these years, to an amount of money, over and above his salary, equivalent to the value of 20 shares of the stock of the company. This was brought about by the provisions of the agreement itself: that Mr. Martin should get 20 shares of the stock at the end of every year he worked until the 100 shares provided for in the agreement to be held in trust for him by Mr. Johnston were in this manner surrendered to him. And then when he severed his connection with the paper, either in the manner which the agreement specified or when the agreement should be abandoned, he was obligated to retransfer the stock he held to Mr. Johnston or to the W. J. Johnston Company, and to receive therefor the value of the same in cash.

There was nothing objectionable in this provision of the agreement, nor was it in any way injurious to Mr. Martin's interests. The stock was given to him by Mr. Johnston without any consideration being paid by Mr. Martin and without any obligation upon Mr. Johnston to give it. Nothing could have prompted Mr. Johnston to giving it except a desire to recognize Mr. Martin's services rendered in times past to The Electrical World, and to encourage him to be equally useful in whatever his future connection might be with the paper.

We do not wish by making allusion to this to refer to it in any way which will be likely in the least to offend Mr. Martin, nor should we refer to it at all but that it is proper to call attention here to the fact that he had under all former agreements been paid in full for the services he had rendered, and that Mr. Johnston was then under no obligation to add anything to the compensation which had already been given to him. It is especially proper to make this plain, when Mr. Martin has been so boldly, sometime ago (though not recently), parading himself as a stockholder in the company, and endeavoring to make it appear that he had been deprived of his rights as such stockholder. Such performance on his part would naturally lead one to believe that he purchased and paid for the stock, which would not be correct. He paid nothing for it at the outset, nor at any time afterward, only so far as the fulfillment of his agreement, had he done so, might be regarded as payment. Therefore, if Mr. Johnston's action in giving him this opportunity of acquiring the stock, and of retaining it so long as he remained connected with the paper, and of obtaining its value afterward, was not one which entitled Mr. to some sense of gratitude on the part of Mr. Martin, it certainly was one for which Mr. Johnston might reasonably expect Mr. Martin would show some sense of apreciation. All this, however, is purely a matter of taste or judgment: If the old adage it not being a handsome thing to" look a gift horse in the mouth" could not be made to apply here, it could be brought to fit without very much alteration of the facts.

All the stock at the time the company was organized was the property of Mr. Johnston. It represented his ownership of The Electrical World and the business connected therewith. That ownership was his exclusively, and neither Mr. Martin nor any one else had any claim upon it. Whether Mr. Johnston would divide that ownership with Mr. Martin and others was a matter which lay entirely within Mr. Johnston's judgment and generosity to determine. Mr. Johnston had acquired his right to the property by his connection with and his labor and money expended upon the paper before Mr. Martin ever formed its acquaintance. We have not yet become so communistic that any one will seriously claim, not even Mr. Martin, we trust, that there was any *obligation* on Mr. Johnston's part to give up any portion of this property to Mr. Martin.

As the agreement provided, it was both natural and reasonable that Mr. Johnston should wish to prevent Mr. Martin from holding the stock after he had quit his employment on the paper. It is not necessary to point out now the fact of Mr. Martin holding such stock after he had ceased to be connected with the paper, and perhaps become, as he did become, interested in the welfare of another electrical journal, would be both injurious and dangerous to the interests of The Electrical World. We do not think it is entirely creditable to Mr. Martin that he apparently failed to recognize the reasonableness and the plain meaning, object and purpose of this provision of his contract.

It will be also noticed from a reading of the agreement that in addition to the 20 shares of the stock which Mr. Martin was to get every year, the salary which was to be paid to him during the time he worked

under this contract was the sum of $2,500 per annum; but that was not by any means the entire compensation he was to receive. He was assured by the terms of the contract during the first three years he maintained his connection with the paper an additional income of $2,500 a year, which was to be paid to him in lieu of dividends, or rather as a guaranteed dividend, on the 100 shares of stock which was to stand in his name. These two sums alone, the salary and dividends, made the compensation for his labor on The Electrical World $5,000 a year. By carrying out his contract faithfully to the end of five years he would, in addition to the salary and dividends, become entitled to the actual possession of 100 shares of the stock, which, according to his own extraordinary claim, which we will presently refer to, would be worth just $66,666.70.

As will be seen from the fac-simile letter on this page, Messrs. Martin and Wetzler claimed that 20 shares of this stock were worth the sum of $13,333.34, and they made a demand upon Mr. Johnston for the payment to each of them of that amount. We wish to mention this fact now in connection with the question of salary or compensation. If we assume that at the time they made this demand they believed in the correctness of their own estimate of the value of this stock and were honest in making this demand for $13,333.34, and we suppose they will not find any fault with us for making this slight assumption of honesty on their part, then according to their own opinions Mr. Martin was receiving for the work he performed compensation at the rate of over $18,000 a year; because the salary was $2,500 a year, the dividends guaranteed were $2,500 a year more, and the value of the stock which he earned every year he performed his agreement was, according to their own estimate, $13,333.34.

We will not seriously claim that the stock was worth any such sum as that which Mr. Martin and Mr. Wetzler demanded for it, but, as we said before, we are justified in referring to their estimate of its value as shown by this demand when we consider their compensation, and include the stock as a part of that compensation. If they did not consider the stock was worth as much as they claimed, they were not fair in making a demand for that amount, and if they were honest in making this demand, then they must have believed, and had grounds for believing, that the stock was worth the sum they claimed; and consequently must have considered that at the time referred to they were receiving the amount of compensation which we have specified. So that upon the score of compensation there could be no grounds for dissatisfaction. Witnesses who knew the facts testified on the trial of this action that when Mr. Martin left Mr. Johnston's employment the position he secured upon the paper with which he is now connected yielded him only a yearly compensation of $2,500, and that this sum was his entire recompense for his labors on that journal. Seldom, if ever, did vaulting ambition which has caused many a man to overreach himself bring about a greater fall than we behold here—from $18,000 to $2,500.

There was never a suggestion at any time throughout this controversy that Mr. Martin's salary was not paid, or that the amount agreed to be paid in lieu of dividends was not promptly met, or that the stock which the agreement provided should be surrendered to him was not surrendered.

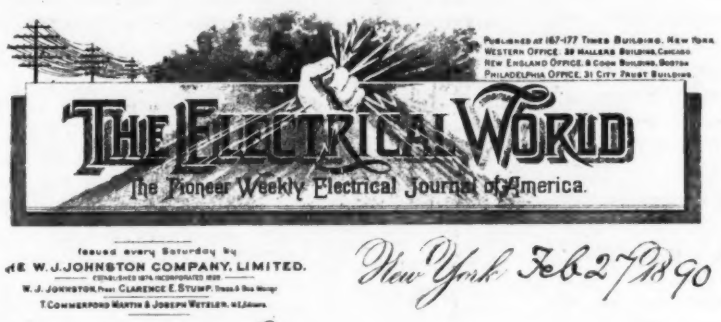
What, then, was the cause of all the trouble which arose between Mr. Martin and The Electrical World?

It commenced in a mild form immediately after the surrender of the first 20 shares—all that he ever had—which accrued to him on the first of January, 1890. All we know about the cause of the trouble is that for some reason Mr. Martin became dissatisfied. Probably no one outside of Mr. Martin himself, and possibly of one or two in his immediate confidence, knows any more. He never explained what were the grounds of his dissatisfaction.

It may have been that he regarded himself and his services to The Electrical World as indispensable, and that by the course which he set out to pursue he hoped to bring about some revision of the financial arrangements which existed between him and the paper; but he ought to have known in view of the amount he was then being paid that the business could not stand. If his judgment led him to think that the paper could not dispense with his services he was clearly in error; for The Electrical World did dispense with his services, and has gone right on from that day to this as though it had never known of his existence.

His dissatisfaction may, perhaps, have been merely that discontent which oftentimes arises, strange to say, from prosperity. Or it may have been merely an error of judgment, into which the shrewdest of men will often lapse, when they miscalculate their surroundings; when, as they sometimes do, they make the serious mistake of supposing that what was given to them in a spirit of liberality was nothing more than a payment made under the pressure of a necessity amounting to compulsion.

Whatever was the moving cause of Mr. Martin's action, we know nothing which enables us to speak from positive knowledge, and, therefore, we will not essay to guess, but this we do know, that Mr. Martin was given on more than one occasion during the trial of his action the opportunity to tell fully all the grounds he had for complaint, and a careful search of his testimony, as will be seen later on, discloses nothing more as the basis of his grievances than is found in such expressions here and there throughout his testimony as "Mr. Johnston treated me badly." "I was suffering under vindictive torture." "Johnston took the mail away from me and gave it to Colvin, although he was a subordinate."


THE ELECTRICAL WORLD
The Pioneer Weekly Electrical Journal of America.
Published at 157-177 Times Building, New York.
Western Office, 39 Hallard Building, Chicago.
New England Office, 8 Cook Building, Boston.
Philadelphia Office, 31 City Trust Building.
Issued every Saturday by
THE W. J. JOHNSTON COMPANY, LIMITED.
W. J. Johnston, Pres. Clarence E. Stump, Treas. & Sec.
T. Commerford Martin & Joseph Wetzler, Editors.

New York Feb 27 1890

J. A. Hall Esq
"Times" Building N.Y

Dear Sir

Having learned from you that Mr W.J. Johnston desires us to make a proposition looking to the severance of our connection with the business, we present the following:

We will cede and relinquish all rights, stock, interest, &c. in the W.J. Johnston Co. Limited, and its goodwill, &c. and will resign our positions as editors of the Electrical World, upon the receipt by each of us in cash of the amounts and sum designated below.

The calculation is made upon a 6 per cent income basis, and upon the net earnings of last year, estimated at $100,000.

Following are the items

Value of 20 shares of stock.... $13,333.34
50 % of " " " additional, due each Dec 31, 1890 .... 6666.66
50 % of guarantee of $2500 to each for the year ..... 1250.—
Total for each .... $21,250.—

To this is to be added 50 % of our respective salaries which we would receive under our contract if we remained for the year—less the amount of salary already paid to us each this year. The offer herein embodied is subject to the condition that the final settlement of this matter is concluded on or before April 1 1890 After that date we should expect and ask better terms

Yours truly
T. C. Martin
Jos. Wetzler

FAC SIMILE OF LETTER FROM MESSRS. MARTIN AND WETZLER EMBODYING THEIR EXTRAORDINARY DEMAND.

"Mr. Johnston refused to let me look at the yearly balance sheet"—and some few other like peevish wails—ance sheet"—and some few other like impressive wails—the specimens just quoted.

As something akin to speculating as to the cause of this trouble, it may be worth while to remark that at about the time Messrs. Martin and Wetzler commenced to manifest a spirit of indifference or unfriendliness, or whatever it may be called, toward The Electrical World two other employees gave evidence of being actuated by feelings somewhat similar; and some time afterward they also became restive under the agreements which existed between them and the paper, which, as has been said, were substantially the same as those of Messrs. Martin and Wetzler. The men referred to remained, however, in their positions for a short time after Messrs. Martin and Wetzler were discharged. From that time until they left they pursued a different course toward the W. J. Johnston Company to that which brought about the discharge of the editors, although apparently they had ends in view which they understood thoroughly, as the seque. showed.

In the case of these men, they solicited from Mr.

Johnston an abandonment of the agreements which existed between them and him, and the advancement of a sum of money, as the value of the full 100 shares of stock then standing in their names, which, of course, they would have been entitled to only when they had remained in their employment for five years from the first day of January, 1889. These advancements and the abandonment of the existing contracts were secured upon the assurance that they would enter into new agreements with the W. J. Johnston Company to work for it for a term of five years at the same salary or compensation which they were receiving under the agreements which they sought to have abandoned. Their request for a change in the agreements and also for the advancement of the money was complied with, and the new agreements requiring them to work for five years were made; and then having secured the money for the stock which otherwise they could not have got until they had worked five years under their first agreements they deliberately broke the new agreements.

In their case it is perfectly plain that they were not acting in good faith, and that the end which they desired to attain was to secure from Mr. Johnston the value of the stock which the agreements then existing between them and him provided they would be entitled to receive only when they had fulfilled these agreements by working for five years for the company. Had they broken the first agreements at the time they broke the second they would not have had and could not have obtained the value of the full hundred shares of stock. Apparently, having secured this, the moral or legal obligation to carry out the new contracts was something they did not regard for one moment.

Whether Messrs. Martin and Wetzler were moved by somewhat similar motives, or whether their conduct was, as we said before, merely a blunder, is a matter about which we can only surmise, and about which our readers will reach probably as correct a conclusion by inference as we can, especially when they shall have read the testimony of Messrs. Martin and Wetzler.

To leave off speculating and return to the facts, however, about the beginning of the year 1890, and after the 20 shares of stock to which Mr. Martin was entitled under the terms of the contract for the year 1889 had been surrendered to him, the relations between him and Mr. Johnston became strained. While there was at this time no interference whatever by Mr. Johnston with him in the discharge of his duties as editor, he showed a disposition to antagonize everything which Mr. Johnston proposed in reference to the business connected with the paper. There were no reasons advanced by him why Mr. Johnston's views should give way to his opinions, but it clearly appeared that Mr. Martin had set to work in a factious spirit to bring about a quarrel between himself and the president of the company.

This conduct on the part of Mr. Martin, which had existed and which had produced dissension between them for more than two months brought them into a decided clash for the first time during the preparations which were being made by The Electrical World for the Electric Light Convention, held in Kansas City in February, 1890.

Mr. Johnston, under the by-laws of the company, and in the exercise of the powers given to him by these by-laws as president, had the right, and it became his duty, to direct who should attend the convention as representatives of The Electrical World, and exercising that right he announced that he, himself, and Mr. Stump should go to the convention. Mr. Martin declined to abide by this decision, and persisted in stating his intention to go to the convention, or to have Mr. Wetzler go there. It is true he said, when a witness on the trial of his case, that he would not have gone, because at that time his wife was ill, but the circumstances hardly bear him out in that statement.

Immediately after Mr. Johnston refused to sanction his going he commenced to shape his actions to bring about either his own or Mr. Wetzler's attendance at the convention in spite of Mr. Johnston's wishes. The first move he made in that direction was an endeavor on his part to get a resolution passed at a meeting of the board of directors of the company that Mr. Wetzler should go, or that the editorial department should be represented at the convention.

Such a resolution would, of course, had it passed, been a reflection on Mr. Johnston's action—Mr. Martin, himself, has testified that by it he meant to have Mr. Johnston's action in the matter brought to the notice of the board.

To support this resolution Mr. Martin knew that he could rely without any question upon Mr. Wetzler's aid, but for the purpose of carrying it he had also to secure the support of Mr. Hunt or Mr. Stump, who were the remaining members of the board. In this he failed. Mr. Stump declined, as he testified, to support the resolution, and urged Mr. Martin not to offer it. Mr. Martin, being aware that it would be useless for the accomplishment of his purpose to offer the resolution and have it defeated, abandoned it.

If there could be any question raised as to the correctness of Mr. Johnston's decision in refusing to allow Mr. Martin to go to Kansas City, that decision had then been sustained by the unofficial action of the members of the board of directors in refusing to consider Mr. Martin's resolution or to disapprove of the course Mr. Johnston had pursued.

Instead of this setback having put any check upon Mr. Martin's purpose, it seemed to fix him more than ever in his determination to show his disregard for anything which he was led to believe was Mr. Johnston's wish. Immediately after this, and, as we, suppose, for the purpose of showing Mr. Stump how he regarded his action in failing to support this scheme, he declined to speak with Mr. Stump, and refused to confer with him about the business affairs of the paper. Mr. Stump admitted this under oath, when called as a witness for Mr. Martin at the trial, and also admitted that Mr. Martin carried this feeling so far that he (Stump) was compelled to complain to Mr. Johnston about Mr. Martin's actions; and he informed Mr. Johnston that when any business in connection with the office had to be transacted between him and Mr. Martin that Mr. Johnston would have to find some person to act as a messenger between them.

At this time, and for some time previous, Mr. Martin was holding no communication whatever with Mr. Johnston. He passed Mr. Johnston as though they were entire strangers. Mr. Martin has admitted this under oath, and has also admitted, although somewhat reluctantly, that at this time he was possessed of ill-feeling toward Mr. Johnston.

Such was about the state of affairs in January, 1890. It grew from bad to worse until March, when Mr. Martin was discharged. At present we shall specify no further Mr. Martin's actions; even all we have said would not have been said if it were not for his paragraph in the "Engineer" of June 22, 1892, and the stand the "Engineer" took in connection with that paragraph. But we shall print the testimony in his case, and print it fairly, not suppressing anything which was brought out and which we believe can tend in the least degree to present in the most favorable light Mr. Martin and his case; and, having done that, we will leave whoever may choose to read it to judge whether Mr. Martin's conduct was fair at the time he was discharged; and also whether it was fair, knowing the facts as he, above all other men knew them, on June 22, 1892, when he published the slanderous statement he did in the "Engineer."

The trial took place before Hamilton Odell, Esq., Referee, on June 24, 1891, at his office in the Equitable Building, New York.

Arthur H. Masten appeared for the plaintiff and Thomas J. Keigharn, for the defendants. Mr. Masten opened the case for the plaintiff, making a statement of what he intended to prove, and then offered in evidence the contract between W. J. Johnston and Thomas C. Martin, just quoted, and the following letter:

New York, June 7, 1890.

T. C. Martin, Esq.:

Dear Sir: Please to take notice that I elect to terminate at the end of this year the contract between us dated Dec. 26, 1888.

I am ready to purchase now for cash the 20 shares of the capital stock of the W. J. Johnston Company, Limited, delivered to you under that agreement, and hereby ask you to name a price for the same.

A prompt reply will oblige,

Very truly yours,
W. J. Johnston.

Mr. Masten also offered this letter in evidence:

New York, March 5, 1890.

T. C. Martin, Esq.:

Dear Sir: Your services as editor of The Electrical World will not be required after to-day. If you have any personal belongings at the office please remove them this afternoon. The cashier will pay you on Saturday the amount due you for salary.

Mr. Hull will see you at any time with a view to agreeing upon the price for the stock of the company owned by you. Should no agreement be reached in this way, the matter will, of course, go to arbitration, as provided for in the contract of Dec. 26, 1888.

Very truly yours,
W. J. Johnston.

Mr. Keigharn objected to its admission at this time.

Mr. Masten: It is simply to fix the date.

Mr. Keigharn: I object to that, Mr. Referee, because there is a question in my mind whether Mr. Masten is not trying to change the complexion of his action. He is apparently going on the theory of suing for a breach of the contract, while his complaint is for specific performance of the contract. I don't propose to allow Mr. Masten to prove that Mr. Martin was discharged on the 5th of March. I will prove that later on, should it become necessary. I take it for granted that Mr. Masten cannot prove that now.

Mr. Masten: I do not propose to change the complexion of the action at all, but if you object, I will lay the letter aside for awhile.

Frank Reginald Colvin, called in behalf of the plaintiff, being duly affirmed, examined by Mr. Masten, testified as follows:

Q. You live in the city of New York, Mr. Colvin? A. Yes, sir.

Q. What is your business? A. Business manager and treasurer of "The Electrical Engineer."

Q. Were you at any time connected with The Electrical World? A. Yes, sir, from about February 1, 1889, until March 8, 1890.

Q. What were your duties when you were on the Electrical World? A. They were varied from the time I went there to the time I left.

Q. What were your duties during the year 1890? A. My duties in 1890 were to answer the correspondence, under Mr. Johnston's directions; and to do any other things which he required of me in the way of an employe of the office.

Q. What relations did your duties have to the editorial department of the paper? A. The mail matter, toward the latter part of my stay there, went through my hands or was in my hands, before I delivered it to them. Sometimes delivered it to them direct and sometimes took it to Mr. Johnston before delivering it, for his action.

Q. Do you know Mr. Martin, the plaintiff? A. I do.

Q. Did your duties bring you in connection with him during the year 1890? A. Yes, sir.

Q. In what way? A. In delivering to him matter for his department and in making suggestions, as between the advertising department and the editorial department, and as at one time having been given complete charge of the office through written instructions of Mr. Johnston.

Q. Do you recollect the time when Mr. Martin left the employ of The Electrical World? A. Very clearly.

Mr. Masten: Look at that paper which I show you.

Witness: I saw that paper written and copied it in a patent letter roller.

Q. It was written by Mr. Johnston in your presence? A. Yes, sir.

Q. And do you know by whom it was delivered to Mr. Martin? A. I delivered it to Mr. Martin.

Q. In person? A. Yes, sir, in person.

Q. On the day of its date? A. Yes, sir.

Q. Up to that time had Mr. Martin performed services as editor of The Electrical World? A. He had, with the exceptions of such occasions when he was not allowed to.

The letter of March 5, 1890, was then offered in evidence.

Mr. Keigharn: I object to the letter being put in evidence. It simply comprises the fact of the discharge and doesn't prove any of the allegations of the plaintiff's complaint. The action is for a specific performance of contract and not for breach of the contract for wrongful dismissal. I object to it as incompetent, irrelevant and immaterial.

Objection overruled and an exception taken.

Q. After this letter was delivered by you to Mr. Martin, as you state, was any offer made by him in your presence to Mr. Johnston to continue to perform services as editor of The Electrical World? A. Yes, sir.

Q. Did he formally offer to continue his services as such? A. Yes, sir, in my presence.

Q. And do you recollect what reply was made by Mr. Johnston? A. Yes, sir.

Q. What was it? A. "I certainly do not wish you to have anything to do with the paper," and in replying to question as to whether he would be allowed to go ahead and do his duties, Mr. Johnston said, "Certainly not."

Q. Do you recollect whether anything was said about his being forcibly ejected from the premises if he continued to perform his duties there? A. Yes, sir.

Q. What was that? A. Mr Johnston told me to advise the gentleman, Mr. Martin and one other, to leave peaceably and to not make any disturbance; and said that if they would not do that he would have a policeman put them out.

Q. I understand that Mr. Martin, in your presence, tendered his services after he had received the discharge?

A. Yes, formally.

The Referee: On the same day?

A. He received the discharge at night after Mr. Johnston had left. The next day he tendered his services.

CROSS-EXAMINATION BY MR. KEIGHARN.

Q. On March 5, at the time you delivered the letter put in evidence, was there any trouble in the office that you were a witness to; I mean between Mr. Martin and Mr. Johnston?

A. Mr. Martin was not allowed to do his duties, from Mr. Johnston's orders.

Mr. Keigharn: I don't think that is answering my question.

The Referee: No; strike it out.

The question being read the witness answered. A. Yes, sir.

Q. What was it? A. The trouble was, as far as I could get at it, Mr. Martin wanted to see the books of the company as a stockholder and wasn't allowed to do so.

Q. Who was with him when he was wanting to examine the books? A. I was there on one occasion.

Q. Who else? A. Mr. Wetzler.

Q. Who else? A. Mr. Johnston.

Q. Who else? A. The clerks in the office.

Q. Had he anybody there to examine the books for him?

A. Well, there were two occasions—

Mr. Keigharn: I mean the 5th of March. Confine yourself to that time. A. I don't remember that.

Q. You are not able to recollect the fact that he had anybody with him? A. Not on that day.

Q. When was it he had anybody with him to examine the books? A. His expert bookkeeper had been given power of attorney to examine the books—so I was told.

Q. I don't care for what you were told. Were you present when the bookkeeper was with Mr. Martin? A. I am not talking about any occasion when I was not present.

Q. You said a few minutes ago that Mr. Martin didn't have anybody with him on the occasion of the 5th of March?

The Referee: He said he couldn't remember.

Q. Were you ever present in the business office of the Johnston company when Mr. Martin had a bookkeeper there to examine the books? A. Yes, sir.

Q. When was that? A. It might have been on the 5th of March or it might have been a few days previous to that. I couldn't say absolutely.

Q. Do you remember any request that was made by Mr. Johnston to Mr. Martin on the 5th of March to leave the business office and go to his own office? A. I won't say that request was made on the 5th of March. I remember that he requested him to go to his own room.

Q. Was the order which Mr. Johnston gave complied with? A. No, sir.

Q. What did Mr. Martin say in response to the order? A. Nothing, except stand still and smile.

Q. Was there any trouble on that day between Mr. Martin and Mr. Johnston; did any loud words pass between them? A. That day? I don't remember whether on the 5th of March or not, sir. I remember seeing that letter written. I don't remember whether the conversation of Mr. Martin and Mr. Johnston was on that day. I am inclined to think it was.

Q. I ask you whether or not on the occasion you delivered this letter to Mr. Martin any loud words passed between Mr. Martin and Mr. Johnston? A. No, sir.

Q. Had you heard anything previous during the same day, in the way of loud discussion? A. I repeat I do not remember whether it was that day or not.

Mr. Masten: I object to this.

Q. What was it you heard on the day you have reference to, whether on the 5th of March or the 4th of March?

Mr. Masten: I want to object to this as immaterial.

The Referee: It is allowed.

A. I heard Mr. Martin make a formal request to get at the contents of the books, and I heard Mr. Johnston order him to his room.

Q. Now, as a matter of fact, at the time that that request was made, had or had not Mr. Martin a bookkeeper or anybody else there who was actually engaged or about to engage in the examination of the books in his behalf? A. I have already answered that I don't remember.

Q. Answer it again? A. I don't remember.

Q. Was Mr. Wetzler present on the 4th or 5th of March during this conversation? A. During the conversation to which I refer, he was.

Q. The bookkeeper who was there was acting also in behalf of Mr. Wetzler? A. I have no means of knowing that, except guessing at it.

Q. Do you remember the 8th of February, 1890, in connection with the business of The Electrical World? A. I do not recollect anything on that day any more than any other day.

Q. Who was doing the press work on The Electrical World on the 8th of February?

Mr. Masten: I make objection to this line of cross-examination, as not brought out by the direct examination.

The Witness to Mr. Masten: Shall I answer the question?

Mr. Masten to Witness: Yes.

A. The press work was done at the Independent Press room on Gold street.

Q. What part of the work was Mr. Atkin performing at that time? A. Composition work.

Q. That is what I was getting at. Do you remember the fact that Mr. Johnston wanted the paper to go to press on the 8th of February, the issue of the 15th? A. I have already stated that I do not remember the particular date. I don't remember that particular date now. I remember a certain Saturday he wanted to go to press—it may have been February 8th. I haven't looked it up.

Q. You are not able to recollect now about that? A. Not now. I remember everything that took place in the office on the day he wanted to go to press. I cannot swear that it was the 8th of February.

Q. Was there anything about the issue of the 15th of February which you recollect, as a reason why Mr. Johnston wanted to go to press on the 8th? A. Yes, sir.

Q. What was it? A. He wished to go to press earlier than usual, as he wished the paper to be at the convention at Kansas City.

Q. Do I understand you to say that you had charge of the mailing department of the World? A. No, sir.

Q. Or the mails? A. I said I had charge of answering the correspondence under Mr. Johnston's directions.

Q. Had you charge of shipping the paper which was intended to go to the convention you spoke of? A. Yes, one batch of the paper. One batch went on the same train as he did.

Q. Do you know as a matter of fact when Mr. Johnston went out there? A. Yes, I have a letter in my pocket confirming the date—Feb. 9.

Q. You say it was written on the day that Mr. Johnston went? Yes, sir; Sunday morning.

Q. The 8th of February was Saturday? A. Yes, sir.

Q. Now do you recollect any considerable effort on Mr. Johnston's part to have the paper go to press on the 8th of February? A. Yes, sir.

Q. What were the efforts he was making? A. The efforts?

Q. Yes. A. Telephoning over to the printer's or ordering people in the office to the telephone asking how the paper was getting along.

Q. Who to in the office? A. I telephoned on one occasion and Mr. Kornfeld.

Q. Who to? A. Mr. Martin.

Q. Was there any trouble there in reference to the paper? A. Not that I know of. Simply anxious to get it out. I telephoned over to Mr. Martin and asked him how he was getting along on the paper.

Q. As a matter of fact was there any delay on the occasion? A. The paper was already ahead of time, and the paper went to press that same night.

The Referee: Was there any delay? A. I cannot answer the question without knowing what you mean by the word "delay."

Q. Were you aware of the fact that Mr. Johnston gave instructions to have that paper go to press on a certain hour of Saturday, Feb. 8? A. No, sir.

Q. He gave you no instructions on that subject? A. No, sir.

Q. Did he make you the means of communication with Mr. Martin and Mr. Wetzler on that subject? A. He had me in the office.

Q. I asked you if he made you the means? A. No, sir.

Q. Are you quite positive of that? A. Yes, sir.

Q. Then, as matter of fact, you did not know that he had given instructions to have it go to press? A. Only by hearsay.

Q. Who did you hear it from? A. I don't remember.

Q. From Mr. Martin? A. No, sir.

Q. Are you sure about that? A. I just had a general impression it was to go to press earlier.

Q. Who did you get it from? A. I couldn't remember.

Q. Are you willing to swear that you didn't hear it from Mr. Martin? A. I wouldn't swear positively.

Q. Are you willing to swear that you didn't hear it from Mr. Wetzler? A. I can't remember.

Q. Or that you had not heard it from anybody in Atkin's office? A. No, sir; I didn't hear it from anybody there.

Q. You are quite positive that Mr. Johnston gave you no instructions? A. No, sir. I was not the proper one to give such instructions to.

Q. Who was the proper person? A. Mr. Martin.

Q. Wasn't Mr. Johnston in the habit of sending messages through you to Mr. Martin? A. Sometimes; yes, sir.

Q. When did you leave the office on the 8th of February? A. Let me see, that was Saturday—do you mean the time of day?

Q. Yes? A. Some time between 5 and 7; I don't remember.

Q. Where did you go when you left the office? A. Home.

Q. On that Saturday had you been in the office all day up to between 5 and 7? A. Practically, except to go out to lunch and over to the printer's.

Q. About how much time did you spend over to the printer's? A. About five minutes.

Q. Five minutes on one occasion? A. In the afternoon of that day.

Q. At what hour were you over at the printer's? A. I don't remember.

Q. Not able to recollect that? A. I remember that I was over there during the day—about noon, I should think.

Q. Whom did you see over there? A. I don't remember that I saw anybody.

Mr. Masten: I desire to renew my objection to this line of cross-examination as immaterial, irrelevant and not called out by anything in the direct examination.

Objection overruled.

Q. Did you speak to Mr. Martin over there, or to Mr. Wetzler? A. I don't remember.

Q. Positive about that? A. Positive, I don't remember, yes sir.

Q. Are you able to tell me when the convention opened in the West, wherever it was? A. No, sir; I was not there.

Q. Do you know when it was to open according to prearrangement? A. Couldn't answer positively. I think it was Tuesday.

Q. Now, to get the paper to that convention when had it to be placed on the train here in New York City? A. I don't know.

Q. You haven't got any idea about that? A. Not any more than any other business man would have as to how long it takes to get there—about 24 hours.

Q. Have you ever been there? A. Yes, sir.

Q. Do you know anything about the running of the trains there? A. To Kansas City?

Q. Yes. A. Not from Chicago; I do from other points.

Q. You are not able to inform us now when the paper would have to be placed on the train to reach there Tuesday? A. No, sir.

Q. You said you were in the employ of "The Electrical Engineer" at present? A. Yes, sir.

Q. How long have you been out of Mr. Johnston's employ? A. Since March 8, 1890.

Q. You went out also with Mr. Martin and Mr. Wetzler? A. Afterwards.

Q. All in a batch? A. No, sir.

Q. Were you discharged? A. No, sir.

Q. You left of your own accord? A. I resigned.

Q. Did you give Mr. Johnston any notice of your intention to resign? A. No, sir.

Q. How long had you been in his employ? A. Since about the 1st of February, 1889.

Q. Mr. Martin is employed with you on the "Engineer" now? A. He is editor of "The Electrical Engineer."

Q. What is your position? A. Treasurer and business manager.

Q. Is Mr. Martin paid a salary there?

Objected to. Objection overruled.

A. He is.

Q. When did he enter the employ of the "Engineer," do you know? A. I couldn't tell absolutely without looking at the books.

Q. Have you any idea, as treasurer of that institution? A. I don't remember. It was some time after he left The Electrical World.

Q. About how long? A. Might have been two weeks.

Q. It was a week or two weeks? A. I wouldn't swear as to the time; the corporation papers will show.

Q. But he has been in the employ ever since? What salary was he paid from the time he entered the employ of "The Electrical Engineer" down to the 1st of January, 1891? A. I couldn't swear positively without recourse to the books. The salary has been changed since he has been there. I don't remember exactly what amount it was he had.

Q. Is it a weekly or monthly salary? A. Yes, sir; weekly.

Q. Pay was each week in money? A. Yes.

Q. Is he a holder of stock in the "Electrical Engineer?" A. Yes, sir.

Q. Do you know how many shares? A. I don't remember; no, sir.

Q. What is the par value of the shares? A. One hundred dollars.

Q. I understood you to say that Mr. Martin's salary was changed? A. Yes, sir.

Q. Do you remember when it was changed? A. No, sir.

Q. Do you remember what salary was paid in the first instance before the change was made? A. Yes, sir.

Q. What was it? A. Fifty dollars a week.

Q. He was paid $50 a week in money? A. Yes, sir.

Q. Was he given any property of any kind as well as that, as compensation, in shares of stock in the corporation? A. No, sir.

Q. Very positive of that? A. He bought his stock and paid money for it.

Q. Under what laws is the "Electrical Engineer" organized? A. I don't remember.

Q. Do you remember what his salary was after the change was made? A. What change?

Q. Change in the amount of salary? A. I remember now—I was thinking of the amount per week—it was $3,000 per year.

Q. After the change was made he was paid $3,000 a year? A. Yes, sir.

Q. Do you remember when the change was made? A. No, sir, not without access to the books.

Q. Are you able to say whether it was before the 1st of January of the present year? A. I think it was after the 1st of January.

Q. You remember meeting Mr. Johnston in Jersey City at the train on Sunday morning, Feb. 9? A. Yes, sir.

Q. Did you hold any conversation there with Mr. Johnston in reference to the trouble occurring as to the paper going to press? A. Yes, sir.

Q. Did you say anything to Mr. Johnston on that occasion as to the manner in which Mr. Martin and Mr. Wetzler acted on the evening before—in any way criticising Martin and Wetzler's actions? A. I don't remember that I did.

Q. Don't recollect anything at all? A. We talked the matter over afterward on the train after leaving Jersey City.

Q. How far did you go with Mr. Johnston? A. To Philadelphia.

Q. Did you say anything to Mr. Johnston to the effect that if you had been in Mr. Martin's shoes you wouldn't act as he acted, and you wouldn't try to destroy Mr. Johnston's property?

Objected to as immaterial.

Objection sustained.

Redirect examination:

Mr. Masten: I understand you to say that you looked after the mail matter under Mr. Johnston's supervision? A. The correspondence; yes, sir.

Q. And you handed it to the editorial staff—Mr. Martin? A. Yes, sir.

Q. Was it your custom to hand the correspondence to Mr. Martin to be opened, or do you mean after it had been opened by Mr. Johnston? A. It was opened by a lady clerk, then handed to me, and I held on to it until after Mr. Johnston saw it.

Q. It was not your practice to hand it to Mr. Martin until Mr. Johnston saw it? A. No, sir, unless Mr. Johnston didn't happen to be coming down that day.

Q. Was this mail matter used in the preparation of the editorial matter? A. Yes, sir.

Q. Was that matter mainly relied on in the editorial department? A. Yes, sir.

Q. Do you recollect at what time the mail matter was sent by you to Mr. Martin on this day that Mr. Keigharn has been asking about—the 8th of February—whether early or late in the day? A. I never handed it to them before 11 or 12 o'clock. I can't remember that particular day.

Q. If you had handed it to them earlier on that day you would have been apt to remember it, would you not? A. Oh, yes.

Q. And what was the reason of its not being delivered to them sooner? A. Mr. Johnston looked at it—inspected it in a general way, and held it back until we had disposed of the general mail, and then the matter relating to the editorial department, I took it out to them.

Q. While you were in the employ of the company during 1890 did you have an opportunity to observe the manner in which Mr. Martin performed his duties as editor? A. Yes, sir.

Q. Was Mr. Martin zealous and active in the performance of his duties?

Objected to. Objection sustained.

Q. What was the manner—state the result of your observations as to the manner in which Mr. Martin performed his work? A. He worked very hard, and took work home nights with him.

Q. And was that his regular custom, or spasmodically, to work hard? A. His regular custom.

Q. On this day, the 8th of February, do you recall Mr. Martin telephoning to you in the morning for the mail matter? A. Yes, sir.

Q. What was the nature of his telephone? A. He wanted me to hurry up and get it over.

Q. Did that occur more than once during the morning? A. Two or three times.

Q. With regard to Mr. Martin's method of performing his duties on this particular 8th day of February, so far as your knowledge goes, did he perform his duties faithfully, or otherwise?

Objected to. Objection sustained.

Q. State your conclusion as to the manner in which he performed his duties on that day? A. He worked very hard, very faithfully.

The Referee: He was at Mr. Martin's rooms, or saw him, only about five minutes; was that the time in which he judged of the manner in which he performed his duties? A. My knowledge was from telephone messages and from his general way of working.

Mr. Masten: He stated that he telephoned in the afternoon as to how they were getting on from time to time.

Re-crossexamination:

Mr. Keigharn: Where did you live at the time you were in the employ of Mr. Johnston? A. In Harlem.

Q. Where did Mr. Martin live? A. I don't know.

Q. When you say he took home work at night you don't know whether he ever worked on it or not—answer yes or no? A. Yes, sir.

Q. How do you know? A. I know that on one occasion I called at his house and saw him working.

Q. Didn't you just now say you didn't know where he lived? A. Yes; I don't know where he lives now.

Q. Didn't you say you didn't know where he lived on the occasion I have reference to? A. I have said yes.

Q. Referring to the conversation which took place between you and Mr. Johnston, did you state to Mr. Johnston in substance on the 8th day of February that Mr. Martin was not working, and that if you were Mr. Martin you wouldn't try to destroy a man's property? I will now ask you the same question. Did you or did you not state to Mr. Johnston words substantially to that effect? A. No, sir.

Q. Did you say—or use—any words to Mr. Johnston of similar purport? A. Not that I remember of.

Mr. Masten: Do you recollect where it was the custom for Mr. Martin and his associates to do their writing, editorial work, on the day when the newspaper went to press? A. Over to the printer's.

Q. And not at the office of the company? A. No, sir.

Mr. Masten: That is all. I rest.

Mr. Keigharn: I must say that things have come to a conclusion that I did not expect. I thought they would have Mr. Martin go on the witness stand.

Mr. Masten: We are waiting for you.

Mr. Keigharn: I have no witnesses here, Mr. Referee.

The Referee: You are entitled to an adjournment, if you wish it, Mr. Keigharn.

Mr. Keigharn: I think I will have to ask for an adjournment, and see what I will do in the meantime.

Mr. Masten: Are you going to make any motion in reference to the complaint?

Mr. Keigharn: No, not now. I would like to, but the

defendants appear to object to having it disposed of on any technicality. I would have been prepared to say what I would do had it not been that you led me to believe that you would take all summer to present your side of the case. When you were here before the Referee, asking to have the other case tried first, you assured the Referee and myself that we couldn't get through with this before the end of the summer.

Thus, and by this evidence only, did Mr. Martin, as he supposed, prove his cause of action against the company and Mr. Johnston.

As his lawyer said, "That is all—I rest"; that is, he had no further evidence to offer, he thought he had put in enough.

On this, and only this, "he rested," not only his demand that Mr. Johnston pay him something between $12,000 and $15,000, but he also rested his efforts to make good all the accusations he had been making for months before against Mr. Johnston.

It is worth while to look into this a little carefully, and see upon what Mr. Martin's efforts were based.

From such an examination it will appear that, viewing this controversy with a simplicity and sanguineness with which only he could look at it, his claims were to be established and his accusations were to be substantiated by showing the existence of four things:

1. His contract, which we have quoted in full.
2. His discharge by Mr. Johnston on March 5.
3. Mr. Johnston's letter of June 7.
4. Mr. Colvin's oral evidence, such as it is, in court.

How this letter of June 7 and Mr. Colvin's evidence could be said to show that Mr. Johnston owed Mr. Martin any money will be somewhat perplexing to the ordinary lay mind. Yet Mr. Martin had a theory by which he worked out that problem—a theory which was as cunning as it was ingenious—but which to make it understood by lay readers will need a few explanatory remarks on the letter and Mr. Colvin's testimony.

How Mr. Martin had ever hoped or had been led to believe that even if this operation had succeeded in wringing some cash from Mr. Johnston, he, Mr. Martin, would have been thereby vindicated, is not easy to understand. The first query which is likely to suggest itself is:

Why did Mr. Martin prefer at this time to have Mr. Colvin act as the witness in his case, rather than assume that role himself?

Nothing which Mr. Colvin attempted to testify to but could have been testified to just as well, perhaps better, by Mr. Martin. It is true that afterward unforeseen circumstances forced him to step into that position, but at this time it is evident that he was content to leave everything which may have burdened his mind unsaid. We suppose he hoped by doing so to simplify matters. Had this ingenious plan worked, the whole thing would have been exceedingly simple for Mr. Martin. But it did not work satisfactorily to him, although it bore some fruit, in the cause of truth, in that it enables us to-day to see how he had shaped his efforts to bring humiliation upon Mr. Johnston, and at the same time preclude investigation into his own conduct. This, we think, will be plainly seen, when we explain his theory of the letter of June 7 and Mr. Colvin's oral evidence.

Mr. Martin's complaint upon which the action was founded contained no allusion to the fact that he had been discharged on the 5th of March, but it did contain two paragraphs which we will quote, and the statements in which are somewhat singular when we consider that they were made by Mr. Martin, under oath. One of the paragraphs we refer to is:

"VI. On or about the 7th day of June, 1890, the defendant Johnston gave due notice to the plaintiff as provided for in said contract, that he elected to terminate the same at the end of the year 1890, and said contract thereby became and was terminated on the 31st of December, 1890."

This statement is singular in that Mr. Martin should treat or regard the letter of June 7 as "the due notice provided for by the contract," and should swear that the contract was terminated on Dec. 31, 1890, when he knew he had been discharged over nine months before, on the 5th of March. As we said he made no allusion to this discharge in his complaint. Had he made this statement in his complaint as to the termination of his contract upon belief, based on information or advice imparted to him by his counsel; thereby asserting merely that this letter had in law such an effect as he claimed, his action might not be open to criticism; but that he should claim that he seriously regarded it, as the notice provided for in the contract, as a means of terminating that contract which was already at an end is singular in the extreme.

The other paragraph of his complaint which we refer to is:

"VII. The plaintiff further alleges that he has duly kept and performed all the conditions, covenants and agreements to be kept or performed by him under said contract, but that the defendant Johnston has failed to keep or perform said contract on his part, to wit:

"First. No dividends have been declared or paid during the year 1890 upon the one hundred shares of stock standing in the name of the plaintiff by the defendant Johnston, although demand therefor has been duly made, that said defendant has wholly neglected and refused to pay the plaintiff the sum of $2,500 guaranteed in said agreement to be paid in that event upon said stock or on any part of said sum.

"Second. Said defendant Johnston has wholly neglected and refused, although demand therefor has been duly made, to deliver or surrender to the plaintiff twenty shares of the stock of the defendant corporation, which he was entitled to receive under said contract at the end of the second year of its continuance, to wit: the end of the year 1890."

The allegations of these paragraphs are even more singular than those of the other. It is strange that he should say that he "duly kept and performed all the conditions, covenants and agreements" of the contract, when he knew that he had not performed any work for the company after March 5, 1890, the day upon which he was discharged, and when from about that day to Dec. 31, 1890, he had been working all the time for the "Engineer." This is especially strange when we consider that he sought to avoid having the grounds of that discharge inquired into

Still more strange is it that he should complain that he got no stock for 1890, when he did not earn such; and that he did not receive the $2,500 guaranteed as a dividend on the full 100 shares, 80 shares of which he was then no longer entitled to, and the remaining 20 shares of which he knew his right to continue to hold was in dispute.

Yet such allegations and claims appear in Mr. Martin's complaint, which was sworn to on Jan. 13, 1891, before a notary public at the city of New York.

But the reason for all this is not after all so obscure, when we read carefully the above evidence and reflect upon what were Martin's Mr. apparent aims and objects, as that evidence and his methods and all that followed disclose.

To this complaint the defendants answered:

(1) That the letter of June 7 was not the termination of the agreement, but that the same was terminated long prior to that time, on March 5, 1890. And they denied that Mr. Martin kept and performed all the conditions, covenants and agreements contained in his contract.

(2) That Mr. Martin was guilty of neglect of duty on the eighth day of February, 1890, in failing to have the paper ready to go to press on that day.

(3) That on the 5th day of March, 1890, he was discharged from the employment for disobedience, misconduct and neglect of duty.

(4) That after such discharge he entered the employment of "The Electrical Engineer."

(5) That he was not entitled to the possession of the 20 shares of stock which he sought to obtain by this action, for the reason that the agreement under which he held such stock had been terminated, and according to its terms he was not entitled to hold the stock after its termination or abandonment.

Had Mr. Martin by this legal contest sought only vindication, he could have accomplished all that by bringing an action on the morning of the 6th of March, 1890, against Mr. Johnston for wrongfully discharging him on the 5th of March. Had he done so no one could ever truthfully suggest that anything more than protecting his name untarnished—which is a most laudable purpose in any man—had actuated him in launching out into litigation. It may be true that he could not have succeeded by that course in making Mr. Johnston pay him all he might have earned by his work the same as he would have earned if he had remained on the "World" during the whole of the year 1890; but this much he would have accomplished: He could have proved successful in such an action—that his quarrel was just, and, it being so, that Mr. Johnston had wronged him; that Mr. Johnston had without just cause broken a contract which he had made with him. He could in that case have proved by the verdict of a jury that the fault did not lie at his door, and also what he insinuated—but did not dare to openly assert—in his paragraph in the "Engineer" of June 22, 1892, that Mr. Johnston had withheld from him, what belonged to him by law and by right.

All this such an action, commenced on March 6, 1890, promptly after the alleged wrong which his discharge on March 5 had inflicted upon him, would have brought about, had Mr. Martin felt and believed he could have sustained such a test. But Mr. Martin concluded to make no allusion to the so-called wrongful discharge. That he carefully avoided; he did not rashly pursue any course which would bring up that question. As we have seen when it was sought to prove by Mr. Colvin that he was then violating his contract by working for the "Engineer," his counsel promptly objected to it, and tried to shut it out, as he did almost everything else which was wrung from Colvin on cross-examination. Mr. Martin did not go into this fight precipitately; he bided his time. He concluded his wounded pride could continue to fester, and that his feelings, those of "intense indignation," as he afterward styled them under oath, must remain unrevenged and unappeased. He waited patiently, like Mr. Wilkins Micawber, for "something to turn up," and something did "turn up." Mr. Johnston in a spirit of peace wrote Mr. Martin a letter, that of June 7, which we have seen, and which we have said would need a word of explanation to lay minds as to the offices Mr. Martin made it fulfill—a letter purposed to carry out the only remaining provision of the disrupted contract, that provision as to fixing by arbitration the value of the 20 shares of stock which Mr. Martin then held, and which, as it appears, he was bound to turn over to Mr. Johnston when the contract was abandoned, on payment of their value as thus fixed.

As the referee afterward said, had Mr. Johnston not written this letter he never would have heard of the lawsuit of Martin vs. Johnston. He wrote it as nine out of every ten laymen unacquainted with the combination of legerdemain, sophistry and nonsense which men sometimes endeavor to foist upon us as the law of the land. Had he only consulted one of these gentlemen who can always find some sort of grounds for making the worse reason appear the better he might have been informed what such a letter in the hands of a man in Mr. Martin's then frame of mind, aided by that peculiar legal ingenuity which is so plentiful, could accomplish.

But the letter reached Mr. Martin and it was evidently both relief and sunshine to him. He had been smarting under his imaginary wrongs for months. He had seen no way to square up the account which he believed he must have with Mr. Johnston; this letter came as it were to gladden and cheer him for a moment. It was only momentary, however, and like all such relief, when the rays of hope which it shed melted, the darkness which surrounded him was even worse than that which enveloped him before it fell across his path.

Never were the literary productions of an absent, but not forgotten, lover more precious to a fair plaintiff in a breach of promise suit than was apparently this simple and innocent-looking epistle of Mr. Johnston's to the plaintiff in Martin vs. Johnston. Just at this time his all depended upon it. His own counsel afterward showed in an able oral argument which he made in support of Mr. Martin's position, after he had "rested" his case as above, how important Mr. Martin regarded it, in these words:

"Now, I shall suppose that when the plaintiff sued Mr. Johnston on his contract that it would be a defence on the part of Mr. Johnston to say: 'Very good; you are entitled to your 20 shares of stock; you are entitled to your dividend *when you complete the year's service, and at the end of the year when you perform your part of the contract; but I have investigated and found out that you were discharged by the President of "The Electrical World," and that that discharge was for cause*, and this being the situation I do not now consider myself bound to carry out my part of the agreement.' Now, it is fundamental, of course, that when a party to a contract prevents the other party from performing, the other party being very willing to perform, when a party prevents the other side from performing, it is not necessary to show full performance, the fact that the party consenting to enforce the contract prevented the other side from fulfilling his part of it, it is a new performance, it takes the place of the entire performance of the contract. *That, as I claim, was the case here. But, it may be said, that does not dispose of the question as to whether or not the discharge was right; whether the president of the company has good ground to discharge. The answer to that is found in the letter which was put in evidence at the last hearing, dated June 7th, 1890*, some three months after the discharge, and after the plaintiff had, as he would naturally do and was bound to do, sought employment and obtained it. Three months, as I say, having elapsed from the date of the discharge, Mr. Johnston, the individual in possession of all the facts, understanding the situation perfectly, knowing his rights in the premises and his intentions, sends a notice to my client in which he says: "You will please take notice that I elect to terminate at the end of the present year the contract between us under date of Dec. 26, 1888, and that I will be prepared to arbitrate on the value of the stock." *Relying on this, no action was taken by my client until the end of the year.*

. . .

"I judge from the answer that it is claimed now that that notice did not amount to anything; that it was sent out as a matter of form, *and that the contract was really terminated on the 5th of March, when Mr. Martin was discharged.* There are two answers to that: In the first place, the contract cannot be terminated in that way, because it is expressly provided within its four corners another method to terminate it, namely, at the end of the year by another notice in writing; and the *second was that after doing this, after the occurrence leading to the discharge, after the discharge, Mr Johnston elected to treat the contract as valid and subsisting. A deliberate election* in that way *cannot be lightly tossed aside;* it is an election on which the other party has a right to rely and does rely, and if Mr. Johnston wanted to claim that the contract was absolutely done away with, violated, broken, so that Mr. Martin had no rights under it at all, it was within his power to treat it as such; but no, he treats it three months afterward as a valid and subsisting contract, and elects to terminate it in the manner provided. *I say, by doing that, it does not lie in his mouth now to raise any question as to whether the contract was fully performed or not; he must be deemed to have waived performance. It does not lie with him to say that Mr. Martin has been employed elsewhere, for he has waived further than that.* I say, by serving this notice, by electing formally to treat the contract as subsisting after the discharge by his employer of Mr. Martin, the *defendant Johnston has waived any question about the performance of the contract or the fact that it was terminated by discharge.*"

This frank statement of Mr. Martin's own advocate is a very lucid exposition of how and where he stood and of his methods of maintaining himself in this contest.

Not only did Mr. Martin rely upon this letter when it came, as his counsel says, *but he waited for it to come.* It came, verifying as it were the truth of the saying "that all things come to him who waits." But how Mr. Martin knew it would come, that he should postpone action for over three months until it did come, is somewhat of a mystery—to us at least—the only solution of which we see is that he never intended to take any action at all until it came. This was also the referee's opinion.

The use which Mr. Martin sought to make of it when it did come, and the pressing needs which he thought it would supply, can be best shown, again, by the words of his own counsel:

"The action is simply against the defendant William J. Johnston, to compel him to perform the contract made by him as an individual, *which we claim to have fully performed on our part*, although he has failed of performance on his part in the two particulars specified in the complaint.

"*Performance by the plaintiff is of course a condition precedent to his right to demand performance on the part of the defendant Johnston.* The facts constituting performance, however, need not be set forth in the pleadings, though *if performance is controverted the fact must be established upon the trial.*

"*It was so established in this case by the letter of June 7, 1890*, and by proof of the fact that the plaintiff was discharged from his employment by the defendant corporation in March, 1890, and was prevented from continuing therein, and was employed elsewhere during the remainder of the year."

"*The defendant Johnston, by serving the notice of June 7th, 1890, recognizes the contract as valid and subsisting on that date.* He cannot claim that it was terminated by the plaintiff at an earlier date. By electing to treat the contract as subsisting on that day, he must *be deemed to have waived any failure of performance*, if such there was, occurring prior thereto. If the plaintiff, by failing to perform his part of the contract at any time prior to June 7th, became guilty of a breach thereof, the defendant was free to treat the contract as broken and to rescind it; instead of this, however, after (as the answer sets forth) the whole matter had been the subject of negotiation, *he deliberately*

elected to treat the contract as subsisting, and by that election he must abide."

The simplicity and open frankness of this is really humorous. There is no mincing matters here; there is the full and explicit declaration that Mr. Martin is not going to trouble himself with the question as to whether he was rightfully or wrongfully discharged. He will reach the goal he has in view by a great deal shorter and easier road. There is no effort at concealment; it "lets the cat completely out of the bag."

All this simply meant that Mr. Martin asked the Court to hold with him that, no matter what his conduct might have been toward the defendant on March 5th, or at any time prior to March 5, because Mr. Johnston had stated in this letter of June 7 that he wished it understood that the agreement was to be ended on the 31st of December, it continued and remained in force until the 31st of December, notwithstanding that Mr. Martin was long before that time out of the employ of the defendants and was working in opposition to them in the same line of business, and was receiving compensation for such work. This was the easy method which Mr. Martin devised to surmount all obstacles which blocked his road.

He made an error, however. He forgot, or perhaps never knew, that if he claimed that that letter restored to him all the rights which his contract with Mr. Johnston gave him, and was to be held in law to do so, the law, which we are taught to believe is the very quintessence of commonsense, would also require that he render in return what was Mr. Johnston's due under the same contract.

But did this letter, as Mr. Martin's counsel said, make "a deliberate election on Mr. Johnston's part to treat the contract as subsisting?" and did Mr. Johnston by it mean or intend "to waive any failure of performance" on Mr. Martin's part prior to June 7? and did Mr. Martin really and honestly believe it was such and meant and intended to be such?

No one, not even Mr. Martin's closest friend, will allow himself to think for one moment that Mr. Johnston ever meant or intended by this letter to re-establish the relations which had once existed between him and Mr. Martin. In the state of feelings which existed between them at the time this letter was written nothing could be further from Mr. Johnston's thoughts. And it will not be seriously considered by any one, even Mr. Martin himself, that had Mr. Johnston imagined when he penned that note it would afterward and for nearly two years be the backbone of the position in which Mr. Martin entrenched himself before the courts of justice of the State of New York, he would have brought down on his head the trouble which, unwittingly, he did, or that Mr. Martin would have got from it the solace and encouragement which it afforded him during that time. Had Mr. Martin succeeded in his lawsuit we can imagine how he would afterward have chuckled whenever he recalled his methods which led him so easily and quickly to success.

There may be cases where a man makes a statement to another, and that other may rely on that statement, and perhaps do something which, had the statement not been made, he would not have done. Then it seems to us right and proper that the law should hold that as between those men the statement made by the first must be taken as true, and that their rights and liabilities ought to be adjusted according to the facts as represented by that statement. But Mr. Martin's case had no such support. He knew better than any man living that Mr. Johnston had peremptorily discharged him from this employment, and from the obligations of the contract on March 5, 1890, three months before that letter was written, and that that discharge had fixed their conditions toward each other unalterably, and that by that letter Mr. Johnston never meant or intended to change these conditions. Knowing this, and no one can doubt that he knew it, then even had the outcome of his lawsuit—founded on this letter and Mr. Colvin's evidence only—been all that Mr. Martin hoped for, and had Mr. Johnston been compelled to pay $12,500, which was the least amount Mr. Martin contended he was entitled to, that condition of affairs would have been brought about, and Mr. Johnston would have been mulcted, not because of any wrong which Mr. Martin had *shown* he had done him, or because it had been made to appear he really owed that amount of money to Mr. Martin by any obligation he was bound in morals to recognize, but because Mr. Johnston had written a useless and foolish letter, and Mr. Martin had thereby caught him, had persuaded a court of justice to hold that by that letter Mr. Johnston had deliberately "elected" to do something which no sane man could ever allow himself to believe he meant or intended to do. Yet this is precisely the position Mr. Martin would stand in, had he succeeded by the method—this letter and Colvin's evidence—by which he sought to succeed, and he was conscious, and would have remained so, of the fact that this only had been the foundation of his action, and that it would have been the foundation of his title to Mr. Johnston's money, had he been compelled to hand over the modest amount Mr. Martin asked. Had Mr. Martin accomplished all this, what vindication would there have been in it to him? There would have been none. His position, so far as the discharge was concerned, would not be altered; it would not have been made to appear that his discharge was wrongful; or that he had not been guilty of the misconduct for which he was discharged, because his own counsel said, speaking for him, as to the charge of misconduct, "*The answer to that is found in the letter of June 7.*" Proof of my performance of the contract "*was established by the letter of June 7*," and by it Johnston "must be deemed to have waived any failure of performance." Not that there was no such failure or misconduct on Mr. Martin's part, but that by this ingenious trick in the art of *legal* reasoning Mr Johnston must be deemed to have waived all such failure and misconduct. With this Mr. Martin would have been satisfied; but then he would have had the monetary reward for his vigilance and his ingenuity in turning this letter to such substantial account. His motive was not vindication, for that the course he pursued would never have brought him. His use of this letter, his waiting for it and making it the basis of a lawsuit, was nothing more than a gamble as to which way the legal wheel of fortune might turn.

A New Apparatus for Projection.

Although the advantages of screen projection for illustration of lectures and scientific experiments have been generally admitted, and the projector has been introduced in very many class rooms, the full extent of its usefulness for scientific projection could not until recently be realized, partly because the oxy-hydrogen light is not powerful enough, and the electric arc lamps were not perfect enough to obtain a steady light and satisfactory results. Within the last two years, however, a new style of electric arc lamp has appeared, and one of its principal recommendations is that it is adapted

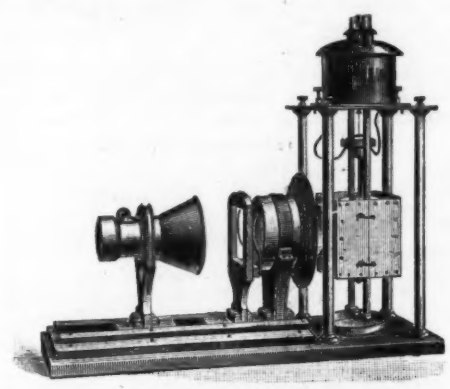


FIG. 1.—THE PARAGON PROJECTOR.

to the incandescent current, insuring perfect immunity from electric shock and an absolutely steady and continuous light. Advantage has been taken of this by Queen & Co., Philadelphia, in the design of an apparatus called the Paragon (Fig. 1).

This new projector differs essentially from all former apparatus in construction. Advantage has been taken of the style of arc lamp to completely separate the optical system from the light. Here we have a complete slide base with a number of carriers disposed upon it similar to an optical bench, and by this arrangement the various lenses or other accessories can be located as desired, and the whole can be set at the proper distance from the light without interfering with its adjustment. A set of three differential condensing lenses, mounted in cells separately, enables the operator to select the most suitable for any special experiment to obtain the best results in illumination, as well as in definition; this is not possible with the old style combined double or triple condenser fixed in the lantern.

For the projection of scenes and diagrams the Paragon is furnished with a special achromatic objective, supplemented with the patent multifocal lens; this lens, placed behind the objective, diminishes its magnifying power without interfering with its definition, so that the distance from the screen can be doubled and yet produce a picture of half the size that the objective alone would give.

This constitutes the Paragon projector for illustrating lectures on history, geography, etc., by views and diagrams; but its principal distinction consists in the accessories, which are really the most important part of a scientific projector, and here we discover at once the advantages of the optical bench.

The vertical prism (Fig. 2), either attached or separate

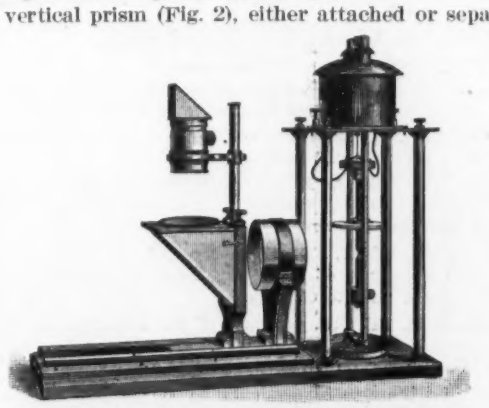


FIG. 2.—VERTICAL PROJECTOR ATTACHMENT.

from the lantern, has always been troublesome for proper adjustment, but no difficulty nor delay is experienced with the Paragon; here it is perfectly central, and a correct performance can be effected in a moment. For the display of magnetic curves by iron filings, cohesion figures in the horizontal tank, etc., this apparatus is indispensable.

The polariscope is composed of a numebr of thin glass plates for polarizer mounted on a slide stand and provided with an object holder which can be rotated; it is easily adjusted to the light so that the refracted ray enters the analyzer and crosses at its centre. If desired, a silvered mirror can be attached over the pile to intercept the reflected ray, which may then be projected simultaneously with the refracted one and thus produce two images.

The analyzer is a 20 millimetre Nicol prism, mounted on a rotating cell, which is fitted in the objective. A complete disc of polarized light can be projected, alternating light and dark with the rotary motion of the analyzer. Among the objects suitable for this instrument may be named the following: Geometrical designs of mica and calcite; chilled glass shapes (verre trempe); chemical preparations; crystallization of acids while in progress. The polariscope is also supplemented by a combination of converging and dispersing lenses for the purpose of exhibiting the colored rings and crosses in crystals in general; for special scientific investigation in crystallography, the necessary graduated circles and verniers, goniometer, etc., can easily be added to complete it.

The projection microscope has for its distinguishing feature, the application of an achromatic negative lens to convert the converging rays coming through the condensing lens into a cylinder passing to the secondary condenser; these are provided with rack and pinion, so that the illumination of the object can be adjusted with great nicety. Not only is the silvery whiteness of the arc light a great advantage, but as the radiant is comparatively a point, the definition given by a good objective is superb. Abundant light is at hand to obtain a power of 1,000 to 3,000 diameters with perfect definition; a flea may be enlarged to 15 feet in length.

An Adjustable Electric Light Hanger.

A simple, efficient and inexpensive adjustable hanger for incandescent lamps, and one easily and quickly attached, has been placed on the market by Stephen Por-

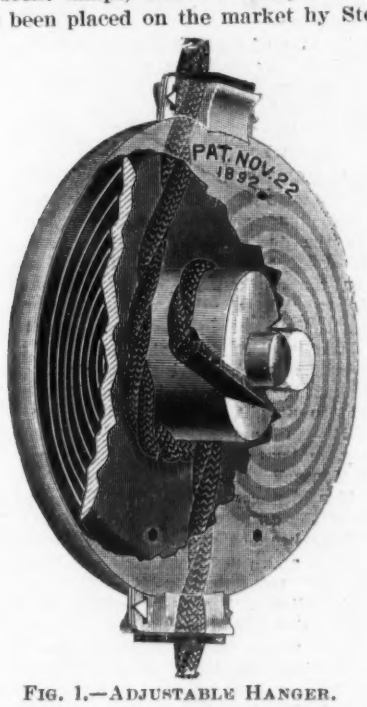


FIG. 1.—ADJUSTABLE HANGER.

ter & Co., 384 Atlantic avenue, Boston. By means of it a lamp may be instantly adjusted to any position within the range without wear to the cord and there firmly held.

Fig. 1 shows the adjuster attached to the cord, with a part of the brass shell broken away to show the wood spindle with the slot through which the cord

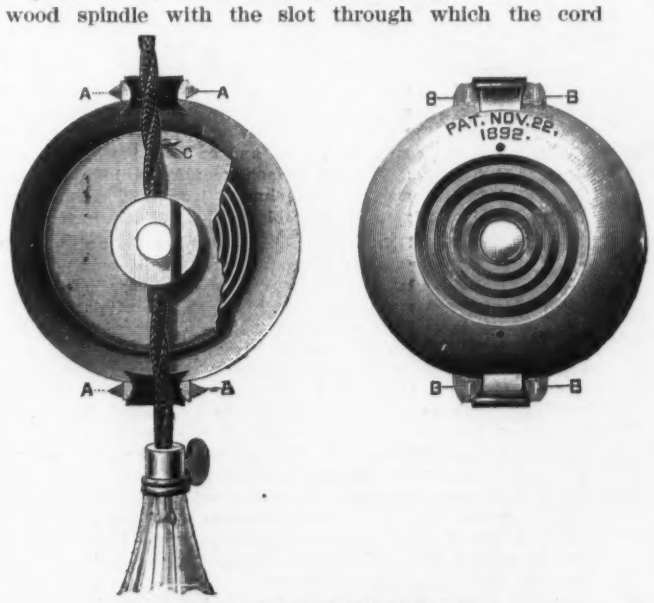


FIG. 2.—ADJUSTABLE HANGER.

passes; the flange on this spindle is also partly broken away in order to show a portion of the regulating spring. Fig. 2 gives a view of the adjuster with one-half of the brass shell removed. The two parts of the shell are made of brass and stamped to the proper shape. One of the halves has four slots marked B and the other four V-shaped points marked A; the wood spindle is secured

to the latter so that it cannot be displaced while the cord is being attached.

In putting up the adjuster, the cord is pressed into the slot of the wood spindle and the shell with the slots marked B is then placed in position so that the four V-shaped points A extend through these slots; the points are then bent down, thus securing the two halves firmly together. If the pin marked C is then removed the adjuster is ready for use. The spring should be regulated to the desired tension before securing the two halves together, which may be done by holding the halves together with the hand and working up and down until it is judged that the adjustment is correct. If the adjuster requires to be removed up or down on the cord after being attached this may be done by simply pulling the lamp down to its extreme position and then moving the adjuster to the desired point, the cord slipping through the slot without injury. The adjuster is made in two sizes; No. 1 size adjusts through 30 inches and No. 2 through nine feet.

Financial Intelligence.

THE ELECTRICAL STOCK MARKET.

NEW YORK, Sept. 23, 1893.

WESTINGHOUSE ELECTRIC common and preferred stock has for the last six weeks been steadily appreciating in the Boston and Pittsburgh markets. This gain has not been great, but there has apparently been no endeavor to manipulate the prices of the stocks, and the upward movement seems to be in recognition of the solid condition of the company, and of its strict attention to business. An item of the greatest importance to the Westinghouse company is the reported capture, by Pittsburgh parties closely allied to President George Westinghouse, of the street car railway system of New Haven, Conn. The details of the deal are not yet made public, but it is understood that all the motive power will be changed from horses to electricity, and that the Westinghouse company will furnish all of the necessary equipment. Mr. Westinghouse is reported busily engaged in perfecting several patents, the control and manufacture of which must be a source of great future profit. One of these inventions has to do with the furnishing of electricity to street car motors by an entirely new "third-rail" system. A public trial of the new system will, it is reported, be made in this city, at an early date, in order to give everybody interested in transit methods an opportunity to judge of its merits.

GENERAL ELECTRIC continues to exhibit in the erratic course of its quotations the efforts of bear speculators to lower its price on grounds logical or otherwise. Confirmation is given to the declaration that the thousands of shares of General Electric stock held by the Ames estate will not be unloaded on the market, by statements coming from Boston that the Ames holdings will surely not be disposed of just now. The Boston explanation is, however, hedged by reasons that are particularly interesting in view of the big strife now going on among insiders for control of the property. Boston affects to believe that the effort to dislodge President Coffin has at length come to naught, and in confirmation of this emphatic statement, Boston reports have it that just before his death Mr. Ames gave "an option upon 90 per cent. of his holdings to certain Massachusetts capitalists who have been for some time past identified conspicuously with the property, and who are friends of the company's president, Mr. Coffin. This option is said to have been at a price higher than the market price has lately been, and was to run for eight months from Aug. 1." That some bull movement is meditated the course of this stock would indicate. Strenuous efforts have been made to force the price down, and this is being tried so as to obtain a better level on which to boost quotations. The point to buy has, however, been so freely circulated that every time the stock goes down a little the heavy buying puts the stock up again, and it is found practically impossible to bring about any serious decline in the price. A good deal of the buying is knowingly of inside inspiration. The dissensions in the management have not been settled, and the fight for a secure control is as lively as ever. There has been a tremendous revolution in the makeup of department and district chiefs. The reasons for the shakeup are ostensibly on the score of economy and efficiency. This excuse Wall Street is constrained to accept with a sneer, for Wall Street is too well acquainted—in its own estimation, any way—with just what motives prompt the action of insiders. There is no denying that the company is now financially better off than some time ago. Vice-President Herrick is authority for the statement that it has $800,000 cash in bank. There was a little trouble in the beginning of the week regarding a contract involving $20,000 with the W. T. C. Macallen Company, of Maine, and an attachment was filed against the General Electric Company of Lynn, but bond was duly filed in the case, the attachment has been vacated, and the matter is likely to be amicably settled out of court.

WESTERN UNION TELEGRAPH matters do not progress with that smoothness so pleasant to stockholders hopeful of increased dividends. Its business is said to continue falling off, and earnings are steadily decreasing. The officials are doing everything to build up its business and restore its old-time prosperity, and, with this end in view, they have lately made big concessions in the rentals of private wires, and have taken other steps of a similarly heroic nature to promote business, but seemingly to no avail. Asked for an explanation of the decreased business, managing officials lay the blame on the general business depression. Another reason is to be found in the daily increasing competition of the long distance telephone, every day threatening to extend, the deteriorated service and the closing of the poolrooms. This poolroom business is, moreover, likely to get the company into the courts. The Bergen County (N. J.) Grand Jury has been investigating the poolroom business at Fort Lee, and the Western Union Telegraph Company is to be hauled over the coals for what the Grand Jury calls its assistance and participation in a violation of the New Jersey State statutes relating to gambling, and this is likely to prove more real than a mere threat. At any rate the war on the New Jersey poolsellers will result in depriving the company of as goodly a source of revenue as the closing of the New York poolrooms did. Then the Western Union people are having trouble with the Western State authorities, who have determined to eke out State revenues by taxing the company heavily. In Indiana a tax of $2,000,000 has been levied on its property in that State. Of course this is excessive, and the company is justified in the injunction it has obtained against the Indiana authorities, but this is a sample of the Western inimical spirit toward the corporation.

FORT WAYNE ELECTRIC stock has been heavier on the reports that it is to be disintegrated from the General Electric Company. The secession of the Fort Wayne concern is, however, assured, and the company is continuing in the policy herein outlined last week, of founding its own offices in the South and West for the sale and distribution of its own goods.

AMERICAN DISTRICT TELEGRAPH COMPANY'S dividend has been the subject of some discussion by reason of the delay in its declaration. A Wall Street news agency is, however, responsible for the statement that it has not been passed. It has been earned, but action has been delayed on account of lack of a quorum of directors. There has been no difficulty in earning the dividend, as receipts are ahead of last year. This same source of information adds, however, that "there is a feeling on the part of some members of the Board of Directors that it would be better to defer the dividend for the present, while others think the money belongs to the stockholders and should be distributed."

THE EDISON ELECTRIC ILLUMINATING COMPANY, of New York, has won a most important victory in the decision rendered on Tuesday last by Judge Lacombe, granting a preliminary injunction against the Mount Morris Electric Light Company and the United Electric Light Company of New York, from using incandescent lamps infringing on the Edison patent; the main points of the opinion are given in another column. An official is quoted by Dow, Jones & Co. as saying: "This decision establishes the ownership of the incandescent lamp in New York City, and places the Edison company in position to control electric lighting by incandescent lamps in this city, and shuts off unauthorized use of the lamps either by lighting from central stations or by private users. This insures a very heavy increase in the company's income by reason of such ownership."

THE EDISON ELECTRIC LIGHT COMPANY, of Philadelphia, has declared a quarterly dividend of two per cent.; it is payable September 30.

THE EQUITABLE GAS AND ELECTRIC COMPANY, of Utica, has declared a quarterly dividend of 1¼ per cent., payable Oct. 16.

ELECTRICAL STOCKS.

	Par.	Bid.	Asked.
Brush Ill., New York	50	20	40
Detroit Electrical Works	10	2	3
East River Electric Light	100	..	65
Electric Con. & Supply Co. pref.	15	15	16
" " " " com	15	15	17½
Edison Electric Ill., New York	100	93	95
" " " 1sts	...	95	96
Edison Electric Ill., Brooklyn	100	95	100
" " " Boston	100	120	125
" " " Chicago	100	220	230
" " " Philadelphia	100	120	125
Edison Electric Light of Europe	..	2½	5
" Bonds	..	80	85
" Ore Milling	..	5	12
Fort Wayne Electric	..	5	5¼
General Electric Company	100	45⅝	45¾
" " deb. 5's	..	78½	79
Interior Conduit and Ins. Co	100	25	35
Mount Morris Electric	..	..	65
Westinghouse Consolidated	50	22	23
pfd	50	42	43

AFFAIRS OF THE COMPANIES.

THE SCHUYLER ELECTRIC COMPANY'S factory, Middletown, Conn., will close up, it is reported, on account of dissensions among the directors.

E. L. OVERTON & CO., 830 Kansas avenue, Topeka, Kan., has been succeeded by Overton & Lee, who will hereafter conduct the business of manufacturing and repairing electrical machinery at the same location.

A PROPOSED CONSOLIDATION.—A circular has been sent to stockholders of the Thomson Electric Welding Company and the American Projectile Company, looking to consolidating them under a single management. The Thomson Electric Welding Company has an authorized capital stock of $1,000,000. That of the American Projectile Company is $500,000. It is proposed to organize a new company with a capital stock of $1,000,000. As a general thing the stockholders have an interest in both, and it is believed that by uniting them all concerned will be greatly benefited. It will cause a reduction of expenses, and in many ways the new company will start off with advantages which heretofore have not been possessed by either of the old ones. It is proposed to have one-half the stock preferred and one-half common. On account of the reduction of capital, stockholders will not receive share for share in the new company. The ratio exchange has been determined after a careful analysis of the assets of both companies by a committee of their stockholders having substantial holdings. The preferred stock will be entitled to dividends not exceeding 7 per cent. from the earnings of the new company, and any surplus beyond this will be applied to the common stock.

Special Correspondence.

NEW YORK NOTES.

OFFICE OF THE ELECTRICAL WORLD,
167-176 TIMES BUILDING, NEW YORK, Sept. 25, 1893.

MR. GEO. S. BOWEN, of Elgin, Ill., made The Electrical World a pleasant call last week.

MR. GEORGE A. M'KINLOCK, peesident and treasurer of the Central Electric Company, of Chicago, was in New York for a few days last week.

S. R. BRADLEY, JR., Secretary and Treasurer of the Union Electric Company, 45 Broadway, New York, has returned from an extended visit to Chicago.

MR. F. B. SHARP, manager of the Brooklyn Electric Manufacturing Company, 286 to 290 Graham street, Brooklyn, N. Y., left Monday last on a two-weeks visit to the World's Fair.

MR. HUGO REISINGER, 38 Beaver street, New York, has secured the sole agency for carbons manufactured by the Nuernberger Beleuchtungs Kohlen Fabrik, Doos-Nuernberg (Germany).

MR. H. A. LA CHICOTTE, 136 Liberty street, New York, Eastern manager of the Wrought Iron Bridge Company, has returned to his office, having spent some two weeks in the "White City."

THE CORPORATION COUNSEL has decided that the Broadway cable road cannot lay a wire in its conduit for the purpose of conveying signals to the power houses, as the subway company alone has the right to lay wires in the streets.

MR. ROBERT FESSENDEN, treasurer of the Hope Electric Appliance Company, of Providence, R. I., paid this office a welcome visit last week. Mr. Fessenden is very enthusiastic over the success of the World's Fair, and, incidentally, over the success of the Standard arc cut-outs, manufactured by his company.

MR. FRANK S. DE RONDE, general sales agent for the Standard Paint Company, 2 Liberty street, New York, reports active demand from power houses, etc., for the company's P. & B. roofing. One of the large orders recently filled was the roof of the large grand stand, Trenton Fair Grounds, Trenton, N. J. This roofing is claimed to be absolutely water, acid, gas and alkali proof.

MR. HENRY G. ISSERTEL, who has represented the A. B. C. Company for several years, has started in business for himself, as electrical middleman, between the manufacturer and consumer, in electric light and railway supplies, and has opened offices at 39 Cortlandt street, this city. Mr. Issertel is well known in all branches of the electrical business, and his many friends will wish him abundant success.

THE STANDARD UNDERGROUND CABLE COMPANY has just completed and has had accepted a very important contract in New York City in connection with the police department, covering the district on both sides of the city below Houston street. This company is also completing a large contract for the fire department in New York City, and is progressing rapidly on the Philadelphia Traction Company's contract.

PITTSBURGH NOTES.

PITTSBURGH, Pa., Sept. 23, 1893.

THE DIRECTORS OF THE MONONGAHELA ELECTRIC LIGHT COMPANY, of Homestead, near here, held a meeting last night and decided to levy an assessment of $11,000 on the stockholders. This will put the company in excellent financial standing.

THE PENNSYLVANIA RAILROAD COMPANY has decided to place the automatic electro-pneumatic signal system of the Union Switch and Signal Company, of this city, all along its lines from Pittsburgh to New York City. Work has already commenced and will be completed by next spring.

NEW ENGLAND NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
Room 91, Hathaway Building, 620 Atlantic Ave.,
BOSTON, Mass., Sept. 23, 1893.

PEABODY'S MUNICIPAL incandescent electric lighting plant is expected to be in active operation about Oct. 5.

MR. PRENTISS CUMMINGS, vice-president West End Street Railway Company, Boston, Mass., appeared recently before the Committee on Railroads to answer questions from the members of the committee regarding a new and improved fender for street cars. Mr. Cummings stated that there was now a number of orders for fenders before the committee, and asked that the committee furnish them to the West End Street Railway Company, in order that the law department might look them over. The committee is expected to meet again shortly.

AT A RECENT MEETING OF THE ROCKLAND & ABINGTON ELECTRIC RAILROAD COMPANY it was decided to double the capital stock of the company, making it $120,000. It was also voted to extend the line as far as South Weymouth if possible. The Brockton line will be completed as soon as possible, after which work will be commenced on the South Weymouth division. A petition was received from the people of East Weymouth asking that the line be extended in that direction as soon as possible, and the directors thought favorably of the scheme. The present power is sufficient to supply the new roads, and it is thought that Higham will be the next point for the road to reach, and then Nantasket.

THE NEW STATION for the Lynn Gas and Electric Company, at Lynn, Mass., will be built by the Berlin Iron Bridge Company, of East Berlin, Conn. The dynamo room is 58 feet in width by 157 feet in length, the whole space being controlled by a traveling crane. The boiler room will be 48 feet in width and the same length as the dynamo room. The roof of this building will be entirely of iron, constructed under the well known patent of the Berlin company. The Berlin company's patent anti-condensation corrugated iron roofing seems in great favor with electric light and power companies, as it is fireproof, and at the same time they guarantee that there will be no drip or condensation on the under side of the corrugated iron.

WESTERN NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
936 MONADNOCK BUILDING, CHICAGO, Sept. 23, 1893.

THE JENNEY ELECTRIC MOTOR COMPANY, through A. H. Goode, district manager, has sold to the Board of Education of Aurora, Ill., motors to operate the ventilating fans to be installed in the public schools of the city.

P. S. BEMIS, JR., Western manager for the Peckham Motor Truck and Wheel Company, has moved his office from the Phenix Building to 932 Monadnock Block, where he will be temporarily located. He expects to soon have permanent headquarters in this popular building.

THE BRUSH ELECTRIC COMPANY has sold 14 of the 16 65-light 2,000 c. p. dynamos that now constitute the lighting plant in Machinery Hall, World's Fair. Ten of these go to the new lighting station of the Boston Electric Company, Boston, Mass., and the others to John E. Ridall, Pittsburgh.

THE CENTRAL ELECTRIC COMPANY, of Chicago, has recently closed one of the most important contracts given in the West in a long time. It consists of the complete equipment of wiring and fixtures for the insane asylum at Kalamazoo, Mich. There was a great deal of competition for the contract.

THE ELECTRIC APPLIANCE COMPANY reports a number of nice orders for the new Hammond porcelain cleat, which it has been introducing to the Western trade. Its peculiar merit consists in the fact that it is only one piece of porcelain, but at the same time holds the wire away from the wall or ceiling like an insulating knob instead of clamping it against the surface.

S. A. DOUGLAS, who for a long time has been district manager for the Brush Electric Company, of Chicago, and who enjoys the reputation of being one of the best agents in the electrical field, is almost daily adding to his honors in connection with the exhibit of this company at the Fair, as well as in other sections of his district. Mr. Douglas' most recent important victory was the sale of six Sperry street railway equipments

to the Consolidated Street Railway Company, of Chicago, for its Twenty-second street line. This is the first electric railway to be installed within the old corporate limits of the city.

ENGLISH NOTES.

(From Our Special Correspondent.)

LONDON, Sept. 13, 1893.

THE POST OFFICE SERVICE.—The return has just been issued, for Parliamentary purposes, showing the post office revenue and expenditure since 1870, the date on which the telegraphs were purchased. It is satisfactory to note that in spite of a continued decrease in charges to the public, and the rise in salaries to post office employees, the percentage of total expenditure to total revenue still remains at much the same figure as it was 20 years ago, namely, about 70 per cent.

A FATAL ELECTRIC LIGHT ACCIDENT.—The papers are making much of a fatal accident which occurred last night at a transformer sub-station belonging to the Deptford Company. The accident arose in a very simple manner. The transformers at the sub-station are divided into two groups, and when the load is transferred from one group to another, the two groups are for a minute or two in parallel. At six o'clock last night the man in charge of the sub-station switched one group into parallel with the other. He forgot, however, to subsequently switch off the second group, but nevertheless sent a man to clean up the transformers and plug switches connected with them, with the result that the man ended by short-circuiting the 2,400 volt secondary main. The man in charge of the sub-station endeavored to pull the other away from the plug switches, and was himself killed; the man who had short-circuited the 2,400 mains being merely badly burnt. There is some doubt at the time of writing whether the deceased was not killed by striking his head against an iron corner, instead of actually by the electric shock. Both men were at the time wearing rubber soled shoes.

News of the Week.

ELECTRIC LIGHT AND POWER.

BUCHANAN, MICH., is to have the electric light.

SPRING CITY, PA., is to substitute electricity for gas.

ATCHISON, KAN.—An electric light plant is projected.

GOWANDA, N. Y., expects to have the electric light before winter opens.

MARIETTA, PA.—An electric light plant, to cost $20,000, is to be erected.

PORT ANGELES, WASH.—An electric light plant and water power will be constructed.

MATOON, ILL.—Horace S. Clark will be granted a franchise to operate an electric light plant.

ANDERSON, IND., is to be supplied with the electric light from the power house of the electric railway.

NORWAY, MICH.—The Council granted a 30-year electric light and power franchise to John H. Barrington and John G. Sewell.

MARLBOROUGH, N. Y.—W. H. Price, of New Paltz, is interested in a company organized to put in a $20,000 plant in this town.

HASTINGS, NEB.—Sealed proposals will be received to Oct. 9 for lighting the city. Kind of lights not specified. W. M. Miles is City Clerk.

HUDSON, WIS.—The Council authorized the purchase of an engine of sufficient power to operate the city electric light plant. Edwin Pierce, city clerk.

SIDNEY, O.—There will be improvements made in the electric light and gas works by putting in an incandescent light plant. This will necessitate the addition of a dynamo and boiler.

MADISONVILLE, O.—A special election has been held here in the matter of issuing bonds to the amount of $15,000 for constructing and maintaining an electric lighting plant. Result, 231 to 68 in favor of issue.

DOWAGAIC, MICH.—The purchase of the commercial electric system by the Beckwith estate is a good thing for the city, as it means the installment of a first-class plant at an early date. The capacity will be greatly increased.

HAVANA, N. Y.—The Cronk Hanger Company is preparing to put in an electric lighting plant with a capacity of 220 incandescent lights, and the local authorities are being urged to have the village streets lighted by an extension of the same plant.

SALISBURY, MD.—R. W. and W. T. Johnson have bought the water power known as Wicomico Falls and they have also purchased the franchise, plant and good will of the Salisbury Electric Light and Power Company, and will commence work at once on a new plant, with a capacity of 2,500 16-c. p. lights, to be in operation within 60 days.

SMYRNA, DEL.—The Board of Town Commissioners have opened bids for the proposed electric lighting plant, but it was found that none provided for a building, and that all exceed the appropriation of $10,000. It was decided to have new specifications made and to receive bids at an early date that the plant may be in operation by December.

WERNERSVILLE, PA.—Proposals will be received for the furnishing and erecting of an electric light plant at the State Asylum for the Chronic Insane at Wernersville, Pa. Specifications and plans may be seen at the office of M. R. Muckle, Jr., & Co., 210 Drexel Building, Philadelphia, Pa., and proposals must be sent to John M. Reynolds, secretary of the Commission, care Rankin & Kellogg, architects, 1001 Chestnut street, Philadelphia, Pa., on or before noon, Oct. 2.

THE BUCHANAN (MICH.) POWER AND ELECTRIC COMPANY has its dam in St. Joseph run, at Buchanan, completed. It is 394 feet long, 10 feet high, and has 14 inches of water pouring over it at the present time of drought. The power will be used for electrical development, for lighting, heating, cooking and manufacturing purposes. The Dayton Globe Iron Works are furnishing the wheels, shafting, pulleys, stands, etc., of which the first car load was shipped on Sept. 20.

MARENGO, ILL.—Proposals for water-works and electric light plant combined will be received by the mayor and Common Council until Oct. 2 according to plans and specifications on file in the office of the city clerk. One-third or more of the cost of these works will be paid for in cash or in city bonds at par value, and the balance of money necessary to be furnished by the contractor upon such terms and conditions as may be agreed. E. D. Shurtleff, mayor; C. P. Fillmore, city clerk.

JAMESTOWN, N. Y.—At a meeting of the Common Council the Electric Light Committee submitted a report and recommendation reading as follows: That an engine of 300 h. p. a condenser and heater and a pump, together with shafting, fixtures, fastenings, be bought; also three dynamos of 50-light power each, two to be used and one to be held in reserve and the line to be extended in accordance herewith; that the three present dynamos be exchanged for four others with a capacity of 80 lamps of 2,000 c. p. each; that three of said dynamos are to be used and the other held in reserve.

THE ELECTRIC RAILWAY.

MATTOON, ILL.—Horace S. Clark has been granted a franchise to operate an electric light plant.

PLAINFIELD, N. J.—The Plainfield Street Railway will be extended this fall to Dunellen and next spring to Netherwood.

NATICK, MASS.—The selectmen of Wellesley have offered to the Natick & Cochituate Railway a franchise to extend their electric road from the Natick line through Wellesley to Newton Lower Falls.

CORAOPOLIS, PA.—The contract for the new power house for the Coraopolis & Neville Island Electric Railway has been awarded to Wm. Molshafer, work to be completed in six weeks. Price, $6,000. It is stated that the entire route will be in operation by Jan. 1.

ATCHISON, KAN.—The Atchison Street Railway has been sold to a newly organized company, the Atchison Electric Light and Power Company, of which Edward L. Norton, of New York, is president. The lines will be immediately equipped with electricity. A plant is also to be erected.

PORT RICHMOND, S. I.—A meeting of citizens was held in the matter of extending the electric road from its present terminus to Castleton Corners, to cost about $10,000, and the following were appointed a committee to secure subscriptions: A. Greenwald, Monroe Eckstein, Frank Foggin, W. H. Perry and W. J. Quinlan.

NEW BRUNSWICK, N. J.—The New Jersey Consolidated Traction Company, which recently made application to the Union County Board of Freeholders for permission to lay tracks for an electric street railway along the county road from Newark to Elizabeth, is contemplating the extension of the system through Rahway to New Brunswick. A number of prominent local citizens are interested in the enterprise.

BALTIMORE, MD.—It is stated that the project of building an electric road to Washington has been revived by the syndicate composed of Messrs. Elkins & Widener, of Philadelphia, and Hambleton, of Baltimore. On Sept. 16 a conference of capitalists was held in the office of Munnikhysen & Bond, in the Equitable Building in Baltimore, and it was decided to push the scheme to completion. It is stated that ample funds have been guaranteed. The road will secure an entrance into Washington over the Eckington & Soldiers' Home Electric Line and into Baltimore over the lines of the Traction company, as the owners of this latter company are among the principal promoters of this enterprise. The road will be double tracked and built in the latest and most approved manner, and will be designed to attain a speed of from 20 to 30 miles an hour. The City Council of Laurel has granted permission to the new road to survey and lay such road through the streets of Laurel, provided the road is equipped and operated within two years.

MISCELLANEOUS NOTES.

PROF. ELISHA GRAY'S telautograph has been put to a practical test by the Western Union Telegraph Company, Chicago, and has proved an entire success. A wire has been run from the company's office in the Phenix Building to its supply department at 213 and 215 Kinzie street, and for a month all communication accompanying its immense business has been carried on through the telautograph.

THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.—The following officers have been elected for the ensuing year: President, Prof. W. J. Herdman, Ann Arbor; first vice-president, Dr. Franklin H. Martin, Chicago; second vice-president, Dr. A. Lapthorn Smith, Montreal; treasurer, re-elected, Dr. P. J. Nunn, Savannah; secretary, re-elected, Dr. Margaret A. Cleaver, New York City. Executive council, chairman, Dr. Augustin H. Goelet, New York; Dr. W. J. Morton, New York; Dr. G. Belton Massey, Philadelphia; Dr. Robert Newman, New York, and Dr. C. R. Dickson, Toronto, Ont.

AN ELECTRIC BANQUET.—A very interesting banquet was recently given by the Dundee (Ill.) Rapid Transit Company to the councilmen and prominent citizens of Elgin who were visiting Dundee for the purpose of inspecting its lighting plant. The dinner was characterized by the many electrical features introduced, not the least of which was the menu card. This contained a very unique little electrical ode of welcome from the pen of Mr. Geo. Bowen, the son of Mr. G. S. Bowen, well known in the electrical field as the originator and one of the founders of the National Electric Light Association. The bill of fare was electrical in the highest degree.

PROF. E. P. ROBERTS and Mr. L. B. Le Vake, of Cleveland, both well known to many readers of The Electrical World, have established the School of Applied Electricity in that city under very favorable circumstances. There are three methods of teaching: First, entirely by correspondence; second, by correspondence and personal examination; third, by personal attendance and a part of the tuition by correspondence. Prof. Roberts, who is a member of several electrical societies, has had the right kind of practical experience and theoretical training to thoroughly equip himself for conducting a school of this character. Those interested in the matter can obtain further information by addressing Mr. L. B. Le Vake, Secretary, 410 Western Reserve Building, Cleveland, O.

Trade and Industrial Notes.

MESSRS. J. GRANT HIGH & CO., of 123 North Third street, Philadelphia, Pa., report having received many large orders for knife switches manufactured by them.

MR. I. W. KELLY has succeeded the Acme Gas Fixture Company, 1236 Filbert street, Philadelphia, Pa. Mr. Kelly is well known among the eastern Pennsylvania trade.

J. W. PENFIELD & SON, Willoughby, O., have issued an eight-page pamphlet descriptive of the Imperial friction clutches, which displays the most excellent taste in its get-up.

"THE MAGGIE MURPHY LAMP," manufactured by the Pennsylvania Electric Engineering Company, of Philadelphia, is meeting with flattering success, if orders can be considered as a criterion.

THE LA ROCHE ELECTRICAL WORKS, formerly of 116 North Sixth street, Philadelphia, Pa., are now settled in their new and model quarters on Diamond street near Third, where they occupy an entire block.

MR. D. C. SPRUANCE, Manager of the Helios Electric Company, Philadelphia, Pa., manufacturers of the Helios arc lamp, was in New England this week, from whence, as was to be expected, he is sending large orders.

THE PRIESTMAN ENGINE COMPANY, Front and Tasker streets, Philadelphia, Pa., has issued a neatly printed circular containing many recommendations from prominent authorities relative to the efficiency of its oil and gas engines.

THE ELECTRIC IMPROVEMENT COMPANY, Jersey City, N. J., capital stock $10,000, has been formed to manufacture electrical supplies and to do electric lighting, heating, etc. R. Ashley, C. J. Shepard, Philadelphia, Pa., and F. Bell, Jersey City, N. J., are the interested parties.

RIEHLE BROS. TESTING MACHINE COMPANY, Philadelphia, has issued a reduced copy of its catalogue Number 3, Volume I., which is devoted entirely to the celebrated testing machines made by this company. They vary from the most powerful machines for engineering work to miniature ones for testing twine and wire.

THE CENTRAL ELECTRIC COMPANY, of Chicago, has issued a issued a handsomely cloth bound illustrated catalogue of 525 pages. This catalogue is the most complete one ever published by this company, and contains a full illustrated list of the goods handled by this enterprising firm, including wires, carbons, lamps, incandescent and arc; telegraph, fire alarm and telephone supplies.

ALBERT & J. M. ANDERSON, 21 Hamilton street, Boston, on and after Oct. 1, 1893, will be established in their new factory and office, at 289 to 293 A street, near Congress, where with improved facilities, a modern machine shop, with the best modern tools, they expect to be able to largely increase their product, and to fully maintain the high standard which has placed their specialties at the front.

THE ROCKFORD ELECTRIC MANUFACTURING COMPANY, Rockford, Ill., is pushing forward rapidly patterns for its new dynamo of slow speed for 800 lights and smaller sizes, which will soon be ready. Mr. G. F. Penfield, the manager, states he has secured Mr. John D. Ulley, a well known electrical mechanic, for foreman of the shop, and that the business is picking up again, as the financial troubles are about over.

JULIUS ANDRAE has published a second edition of his catalogue of electric light supplies and electrical house goods. The frontispiece is a portrait of Mr. Andrae, and the 128 pages of the book are profusely illustrated with cuts selected for their importance rather than to fill space. The catalogue has the advantage of being of the standard size, which, combined with its intrinsic merits, will cause it to be preserved for reference by retail dealers.

THE CHARLES MUNSON BELTING COMPANY, 22 to 36 South Canal street, Chicago, Ill., has issued a handsome catalogue of 92 large sized pages relating to belting. The pamphlet is well printed on excellent paper, and contains more technical information of value to users and engineers than we have yet seen in any similar publication. A large number of full page half-tones are of value in showing the arrangement of the machinery of electrical plants.

W. E. KAUKE, of Bryan, O., informs us that he was called in recently to examine a bell circuit put in by him in 1886, and found the battery, bought from the Viaduct Manufacturing Company, Baltimore, still in working condition, though put in seven years ago. There was but one cell of Disque Leclanche, which worked two door connections; about 1½ inches of solution remained although the cell had not been touched since put in, and the zinc was full length though badly corroded.

THE WOOLVERTON GLOW ARC ELECTRIC LIGHT COMPANY have purchased a site on the Bronx River opposite Mount Vernon, N. Y., and intend to build thereon a complete plant for the manufacture of electric light supplies for the production of their improved arc light. The entire equipment will cost from $200,000 to $300,000, and will require at the start a force of 200 hands, which will be increased as business may demand.

QUEEN & CO., INCORPORATED, Philadelphia, have placed on the market a new projection lantern called the "Paragon," with which they claim to produce a perfectly steady white light, far superior to the oxyhydrogen jet, and at the same time very much more convenient to operate. Already a number have been supplied to prominent schools where such apparatus is absolutely essential in the proper illustration of scientific lectures. The lamp is adapted for direct or alternating currents, as required.

THE LAIDLAW-DUNN-GORDON COMPANY, Cincinnati, O., have contracted to furnish the Miami Valley Fuel Gas Company, of Piqua, O., two pair cross compound Corliss engines with compound gas compressors; also feed pumps, heaters, condensers, and pipe work. The sizes of the engines and compressors are 22-inch and 40-inch steam cylinders, and 16-inch and 32-inch gas cylinders, all 48-inch stroke. These compressors are used for taking the gas from the wells and forcing it through the lines to the various towns they are supplying. The plant will be erected at Fort Recovery, O.

THE ELLIOT-LINCOLN ELECTRIC COMPANY, Cleveland, O., sends us a copy of its catalogue for 1893-94, containing a description of its system of dynamos and motors. A great deal of valuable information for anybody using motors of any make, or contemplating buying motors of any make, will be found in this catalogue. A number of the tables are original, including those giving data on double and single insulated magnet wire, and on the resistance of copper wire up to 200 degrees Fahr. Another table, giving the fusing points of copper wire of various sizes, has been worked out experimentally. The aim has been to make this a useful book of reference as well as a catalogue of their apparatus.

FRED'K A. SCHEFFLER, general sales agent of the Stirling Safety Water Tube Boiler, 74 Cortlandt street, New York, informs us that inquiries from electric light and power companies, architects, etc., are coming in to a greater extent than they did in July and August, thus showing that business is unquestionably improving throughout the country. Among recent sales of the Stirling boilers are the following: 100 h. p. for Salem, Mass., through their agent, J. Bradford Sargent; 400

h. p. boilers to the Algonquin Coal Company, and 250 h. p. boilers to Lutz, Libby & Co., Park Place, Pa., through their agent, James Melly. Several large contracts are in view, which, notwithstanding the fact of the hard times, they feel pretty confident of closing.

THE CHESLEY ELECTRIC COMPANY, of Jersey City, has purchased the building Nos. 601 to 605 Newark street, Hoboken, N. J., and will remove there Oct. 1. This company has outgrown its present quarters, and as they are handling very large armatures and heavy machinery found it necessary to have a ground floor. The building, situated as it is, at the termini of all freight lines entering New York, is 60 by 70 feet, and will be heated by steam. They will have a 500-volt current for power purposes and ordinary testing, and the alternating current for lighting, the primary being also used for testing alternating armatures and converters. They have a large oven in which all their windings are thoroughly baked, and after being tested with current will also be checked with a Thomson reflecting galvanometer and bridge. This company also buys and sells second-hand apparatus, and with the advantages noted ought to do a flourishing business.

Business Notices.

BATTERY CUT-OUT, CHEAP.—Sensitive, reliable, never requires attention. Gas lighting much improved by its use. Electric Supply Company, of 105 South Warren street, Syracuse, N. Y.

DESK ROOM in the commodious office of The Electrical World, in the new Monadnock Block, Chicago, may be obtained by applying in person or by letter to the office, 936 Monadnock Block.

THE CHICAGO, MILWAUKEE & ST. PAUL RAILWAY runs electric lighted vestibuled trains between Chicago, Milwaukee, St. Paul and Minneapolis daily. Through parlor cars on day trains between Chicago, St. Paul and Minneapolis. Electric lighted vestibuled trains between Chicago and Omaha and Sioux City daily. Through vestibuled sleeping cars daily between Chicago, St. Paul and Seattle. Eight fast trains each way daily between Chicago and Milwaukee. Solid trains between Chicago and principal points in Northern Wisconsin and the Peninsula of Michigan. Through trains with palace sleeping cars, free chair cars and coaches between Chicago and points in Iowa, Minnesota, Southern and Central Dakota. The finest dining cars in the world. The best sleeping cars. Electric reading lamps in berths. The best and latest type of private compartment cars, free reclining chair cars and buffet library smoking cars. Six thousand one hundred and fifty miles of road in Illinois, Wisconsin, Northern Michigan, Iowa, Minnesota, Missouri, South Dakota and North Dakota. Everything first-class. First-class people patronize first-class lines. Ticket agents everywhere sell tickets over the Chicago, Milwaukee & St. Paul Railway, or address Geo. H. Heafford, General Passenger Agent, Chicago, Ill.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

UNITED STATES PATENTS ISSUED SEPT. 12, 1893.

(IN CHARGE OF W. A. ROSENBAUM, 177 TIMES BLDG., N. Y.)

504,732. PRINTING TELEGRAPH; S. R. Linville, Philadelphia, Pa, and L. F. Hettmansperger, Camden, N. J. Application filed Dec. 16, 1892. An exchange system of printing telegraphy, comprising subscribers' instruments, printing and type-wheel circuits in parallel to earth at the respective instruments, and a central station having devices and their complemental circuits for controlling the pole charger and alternator, and for effecting impressions at the subscribers' instruments.

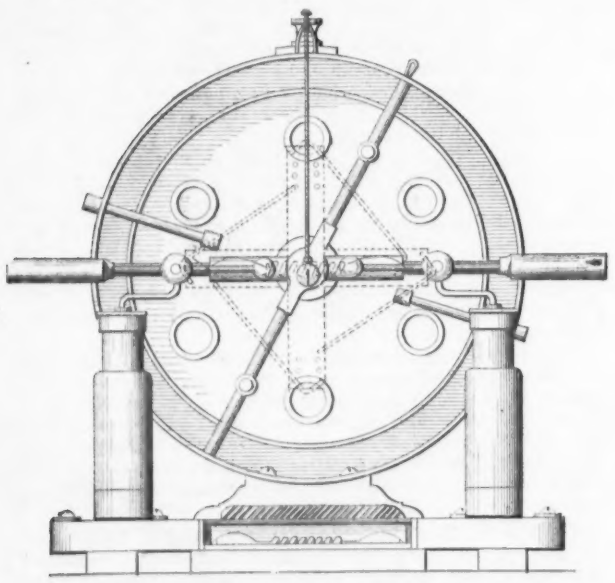
504,734. TROLLEY HEAD; J. P. Maddox, Westbrook, Me. Application filed Oct. 7, 1892. The combination of a trolley pole with a trolley head pivotally attached thereto, the end of the trolley head overlapping the end of the pole, and adapted to move laterally thereon, and springs constantly tending to keep said trolley head parallel with said pole.

504,735. LIGHTING ATTACHMENT FOR GAS BURNERS. N. Marshall, Boston, Mass. Application filed Nov. 25, 1892. A gas burner, a gas tip, and a fixed electrical contact arranged adjacent thereto, combined with the co-operating movable contact spring, an actuator therefor, and a fixed guard arranged in front of the fixed contact to engage with the spring contact in advance of the fixed contact.

504,738. ELECTRIC SWITCHBOARD; F. W. Mount, St. John, Canada. Application filed April 5, 1893. A connector, comprising a bifurcated plate, having flat springs, provided with jaws adapted to clip or grip a rod interveningly, and spring jaws, pivoted to said plate, and adapted to grip a rod offset from the rod gripped by said jaws, and provided with an insulated handle.

504,740. PORTABLE STATIC ELECTRIC MACHINE; T. H. Patee, Chicago, Ill. Application filed Dec. 9, 1892. In a static electrical machine, a stationary generating plate provided with a non-conducting strengthening flange or rim of the form described. (See illustration.)

504,741. ELECTRIC DOOR REGISTER FOR WATCHMEN; W. R. Patterson, Chicago, Ill. Application filed Jan. 31, 1889. The combination with a driven chronograph sheet, of a periodically actuated electro-magnetic pen resting thereon, and adapted to make indications thereon, each of said latter pens being connected in a circuit extending to contact points of different doors, each door, when closed, holding its contact continuously open; whereby the position of said doors as open or shut and the time of change from one position to the other are registered.



No. 504,740.—PORTABLE STATIC ELECTRIC MACHINE.

504,743. SOCKET FOR INCANDESCENT ELECTRIC LAMPS; C. G. Perkins, Hartford, Conn. Application filed July 10, 1891. In an incandescent lamp having on its coupling end a radially corrugated contact surface, of a co-operative device provided with a rib adapted to engage the corrugated contact surface to make electrical connection therewith and lock the parts of the coupling. (See illustration.)

504,745. ELECTRIC SIGNAL DEVICE; C. R. Piggins, Racine, Wis. Application filed April 4, 1893. The combination with an electric circuit, of a metal lid arranged automatically to close a letter chute, the lid being a part of the electric circuit which is open when the lid is closed, and a terminal of the electric circuit so arranged as to contact with the lid and close the circuit when the lid passes it in opening the chute, and to contact when the lid passes it in closing the chute.

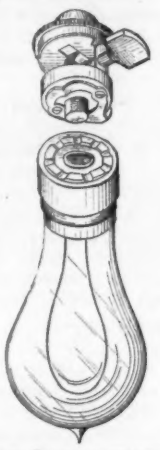
504,746. GALVANIC DRY BATTERY; J. Von Der Poppenburg, Charlottenburg, Germany. Application filed Oct. 11, 1892. As a filling for galvanic dry batteries finely chopped or ground vegetable substances, and especially chopped straw, mixed with hydrates of carbon, such as starch, glucose, dextrine and the like, in combination with a solution of hydroxide of chrome.

504,751. ELECTRICAL TESTING APPARATUS; C. H. Rudd, Evanston, Ill. Application filed Jan. 14, 1888. The method of testing an electric lamp circuit, which consists in successively connecting or tapping a telephone with said circuit at different points while the lamps are burning, and listening at the telephone and comparing the sounds produced in the telephone at the different points with respect to loudness.

504,752. ELECTRIC SIGNAL DEVICE; C. H. Rudd, Evanston, Ill. Application filed Dec. 10, 1888. The combination with a lamp circuit including the dynamo-electric machine, of branch wires, one from each pole of the dynamo, each including a separate condenser, said branches being united in a ground branch and an annunciator included in said branch.

504,753. ELECTRICAL TESTING APPARATUS; C. H. Rudd, Evanston, Ill. Application filed Feb. 8, 1889. The combination with a source of electricity and a working circuit, of a connection to ground from one side of said source of electricity, containing a condenser, a current indicator, and a circuit closing key.

504,754. ELECTRIC MEASURING APPARATUS; C. H. Rudd, Evanston, Ill. Application filed Oct. 19, 1891. The combination, with a resistance to be measured, a condenser, and a battery, of suitable means adapted alternately to connect the resistance, condenser and battery in series, or to discharge the condenser through the telephone.



No. 504,743.—SOCKET FOR INCANDESCENT ELECTRIC LAMPS.

504,760. ELECTRIC ARC LAMP; C. T. Snedekor, Worcester, Mass. Application filed March 20, 1893. In the frame of an arc lamp, an arm with a hollow space sufficiently large to contain an insulated wire, said space being filled with a packing of some refractory material, and covered by a strip of metal secured to the arm.

504,797. RESTORING SYSTEM FOR ANNUNCIATORS; L. A. Berthon, Paris, France. Application filed May 17, 1893. In a telephonic system, an indicator having a swinging shutter, in combination with a rotative pulley adjacent thereto having two studs, one acting to stop its rotation and the other engaging the shutter elastically and moving it to the restored position.

504,801. TELEPHONE TRANSMITTER; J. A. Brown, Moline, Ill. Application filed April 25, 1893. The combination with an electric circuit, of a diaphragm and electrodes with grained sufaces, one carried by the diaphragm and the other by a yielding support, the electrodes being arranged substantially at right angles to each other.

504,815. CARBON FOR ELECTRIC ARC LAMPS; R. McManus, Brooklyn, N. Y. Application filed Oct. 27, 1892. A pair of carbon pencils, the one having a core of lime and the other a core of plumbago.

504,827. ELECTRO MECHANICAL GONG; F. M. Dunn, Baltimore, Md. Application filed June 23, 1892. A device for mechanically operating electro-mechanical gongs, consisting of spring-actuated trains of gearing, an eccentric and rod connecting the same, a vertical sliding rod, cam and catch pin, and an armature and magnets.

504,845. CARBON FOR ELECTRIC ARC LAMPS; R. McManus, New York, N. Y. Application filed July 8, 1892. The combination of coke, mineral oil and iron to form pencils or electrodes.

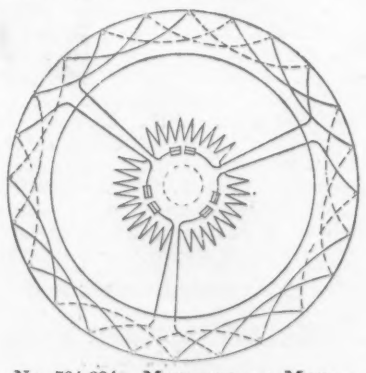
504,847. CONDUIT ELECTRIC RAILWAY; H. D. Oler, Paterson, N. J. Application filed Aug. 23, 1892. The combination with a conduit of electric conductors secured to the sides of the same, a rod passing through the slot of the conduit, arms on said rod, discs on the ends of said arms, a lever pivoted to the car bottom and to said rod, and a spring for drawing said lever and the rod upward.

504,866. ELECTRIC LIGHT FIXTURE; F. W. Davenport, Providence, R. I. Application filed July 22, 1893. In electric light fixtures, an arm provided near one end with an electric lamp, said arm being resilient and capable of automatically returning to its normal form when forcibly bent therefrom and then released, in combination with a retaining member adapted to engage parts adjacent to both ends of the arm.

504,901. COMMUTATOR BRUSH HOLDER; R. N. Bayles, New York, N. Y. Application filed March 30, 1893. A commutator brush consisting of an electric conducting block, whose opposite ends are beveled toward each other.

504,904. MULTIPHASE MOTOR; L. Bell, Boston, Mass. Application filed Nov. 4, 1892. The combination in an electric motor of a closed circuited secondary member forming the revolving part of the motor, with a non-inductive resistance or resistances carried by, or fixed relatively to, said revolving member, and means for removing said resistance from circuit when proper speed has been attained. (See illustration.)

504,914. DYNAMO-ELECTRIC MACHINE; R. Eldridge, New York, N. Y. Application filed May 13, 1891. The combination with a revolving armature, its shaft and machine frames, of two circular ranges of field magnets, circular supports for the respective ranges of magnets and an electromagnet for controlling the position of one range of field magnets in its relation to the other range of field magnets.



No. 504,904.—MULTIPHASE MOTOR.

504,938. ELECTRIC CUT-OUT; H. N. Prentice, Stowmarket, England. Application filed May 31, 1893. In a magnetic cut-out, the combination with the magnet, the armature and the contact pieces, of a pivoted arm having a weight on one end normally opposing the action of the magnet and initially moved by the armature when the current becomes abnormal, and having the other end arranged to kick the contact pieces as the weight falls, with an adjusting screw adapted to regulate the distance between the armature and the magnet.

504,977. SUPPLY SYSTEM FOR ELECTRIC RAILWAYS; G. F. Green, Kalamazoo, Mich. Application filed Feb. 13, 1892. The combination with a source of supply, a moving car, and stationary contact points located at intervals along the line of the railway, of a contacting conductor carried by the car, means for magnetizing said conductor, and means for varying the length thereof. (See illustration.)

504,980. ELECTRICAL ALARM SYSTEM; C. K. Hall and W. B. Lillard, New Orleans, La. Application filed Nov. 2, 1892. A system of electrical alarms comprising two continuous conductors insulated from each other, a plurality of sources of electricity having their terminals connected to each of the said continuous conductors, and forming a bridge between the said conductors, an electrically operated signal device placed in each of the bridges, and a thermostat for electrically connecting said conductors and so operating all of the signal devices.

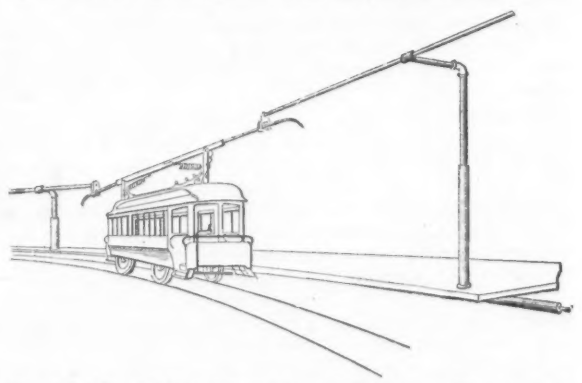
505,025. MAGNETIC CLUTCH OR COUPLING; G. A. Brown, Muskegon, Mich. Application filed Feb. 11, 1893. An electromagnetic clutch comprising an electromagnet, the magnetic circuit of which is interrupted by non-magnetic material; and an armature adapted and arranged to make direct contact with said electromagnet.

505,032. AUTOMATIC SAFETY JOINT FOR ELECTRIC CONDUCTORS; J. H. Curry, Wilkinsburg, Pa. Application filed Nov. 18, 1892. An automatic safety joint for electric conductors consisting of an insulated containing case, conducting stems passing through the ends of the same, springs for forcing these stems inwardly, and two sliding electrical contact surfaces arranged upon the inner ends of these stems and adapted to break circuit by being moved inwardly past each other, and insulation disposed between the conducting stems and contacts on the one hand, and the containing case on the other, to maintain a permanent insulation for the containing case in all positions of the parts.

505,051. ELECTRIC ARC LAMP; W. B. Luce, Brookline, Mass. Application filed Dec. 5, 1892. In an electric arc lamp the combination of a solenoid, a carbon holder extending therethrough, and a magnetic core, consisting of two parts or members, one part or member being movable longitudinally within the solenoid and the other member being movable longitudinally and laterally, and a clutch ring pivoted to the first member and operated by the lateral movement of the second member to grasp the carbon holder.

505,060. PORTABLE ELECTRIC LAMP SUPPORT; N. T. Mills, Boston, Mass. Application filed Oct. 15, 1892. A portable incandescent lamp stand comprising a standard, and a lamp supporting rod mounted thereon, combined with a lamp, a flexible connection between it and said supporting rod, and independent separable bearings for said connection rotatable upon the rod.

505,062. ELECTRIC TIME RECORDER; C. E. Ongley, New York, N. Y. Application filed Jan. 24, 1891. The combination of time printing type-wheels having ratchet wheels connected thereto, a wheel propelled by time mechanism, a shaft turned by said wheel through a series of levers, a propelling pawl for the type-wheels connected to the same shaft, whereby it is moved in accordance with the time mechanism.



No. 504,977.—SUPPLY SYSTEM FOR ELECTRIC RAILWAYS.

505,063. SWITCH FOR GOVERNING ELECTRIC MOTORS; E. F. Ranien, Milwaukee, Wis. Application filed April 8, 1893. A switch for regulating motors comprising a suitable casing, a series of resistance coils within said casing, a series of contact pieces respectively in electrical connection with said resistance coils, other contact pieces electrically connected with opposite poles of the armature, a foot treadle and a connected traversing block carrying suitable contact devices and arranged to engage with said contact pieces to successively bring said resistance coils into or out of the circuit with the armature.

505,064. SWITCH FOR CONTROLLING ELECTRIC MOTORS; H. Sawyer, Muskegon, Mich. Application filed Feb. 20, 1893. In combination with an electric motor a reversing switch, a circuit breaker actuated by the motor, and two independent conductors connecting the reversing switch and the circuit breaker, whereby in the event of the operating circuit being broken by the circuit breaker, a second circuit may be completed in the reverse direction by actuating the reversing switch and reversing the motor.

505,070. TELEPHONE SWITCH; J. Steiner, Brooklyn, N. Y. Application filed Oct. 19, 1891. The combination, with a bar journaled at one point in the side of the call box, so as to be capable of a limited rotary motion, of a radially extended hook formed at one extremity of said bar, and adapted to receive the telephone, a spring acting to rotate said bar, to maintain said hook in a horizontal position, said bar being bent to form a radial extension provided with contact points, and fixed contact points with which said contact points are adapted to make contact in one position of the bar.

505,081. CONDUIT ELECTRIC RAILWAY; C. O. Ehlert, New York, N. Y. Application filed Aug. 23, 1892. In an underground conduit for electric railways, the combination of the trolley guide, of a main trolley arm, of short arm, of branch or fork arms, engaging contact with the electric conductors and drip shields having a concave or plane surface, secured above the electric conductors.

Copies of the specifications and drawings complete of any patent mentioned in this record—or of any other patent issued since 1836—can be had for 25 cents. Give date and number of patent desired and address The W. J. Johnston Co., Ltd., Times Building, N. Y.